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Contractors and Engineers Monthly

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Highlights Of This Issue

- **Defense Construction**
  As our Navy expansion program speeds up to meet the exigencies of the war effort, greater speed is going into construction for the Navy, one of the important projects of which is the Naval Drydock at Bayonne, N. J. The first of our series on this work appears in this issue, as well as another in our series on the CAA airport expansion program. See pages 1 and 7.

- **Planning County Road Work**
  Careful planning for its road construction and building for less expensive maintenance feature the road program in Jones County, Iowa. See page 1.

- **Concreting at Shasta**
  Features of the preparing and placing of concrete at Shasta Dam include the cableway system, the types of concrete buckets, forms, and the cooling and curing methods. See page 2.

- **Licking Rock and Muck**
  This was the challenge to be met by the contractor on a 6-mile relocation and improvement project on U. S. 44 between Eastford and Pomfret, Conn. P. S. The contractor won. See page 2.

- **Paving New Dual-Lane Route**
  Increasing the traffic capacity of its Route 25, New Jersey last summer improved a 6.377-mile section by relocation and building dual lanes separated by a medial strip. See page 9.

- **Highway Maintenance**
  The ever-present problem of highway maintenance will, for the duration, be even more important, for in many cases highway departments may be forced to forego previously planned reconstruction and keep their roads in condition by means of extraordinary maintenance or maintenance-construction. Two examples of this type of work appear in this issue: one is devoted to the problem of fighting frost boils while the other is concerned with various types of low-cost improvement tried out in Connecticut. See pages 22 and 35.

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C. & E. M. Photo
Preparing the soil for the addition of cement on Reservation Highway. A D4 tractor pulled an orchard cultivator during the pulverizing operations.

Soil-Cement Road On Overflow Dam

M. E. Lien Construction Co. Completes 12,300 Feet of New Reservation Highway on Relocated Control Dike

(*Photo on page* 48)

✦ BY the completion of the Reservation Highway dike in Minnesota and South Dakota across the narrow section between Mud Lake to the north and Lake Traverse to the south, the latter has been raised about 1.5 feet. Stop logs will raise this elevation an additional 3 feet.

(*Continued on page* 28)

Dredging Completed For Naval Drydock At Bayonne, N. J.

(*Photo on page* 48)

Largest Drydock in World Excavated by Dipper-Dredge Crest, Largest of Diesel-Electric Excavators Afloat

✦ WHEN Bayonne, N. J., was chosen by the Bureau of Yards and Docks, U. S. Navy, as the site for a drydock capable of handling the largest ships afloat, the depth of excavation was an important consideration in the selection of the equipment. The cost-plus-a-fixed-fee contract for the construction of the drydock was awarded to Great Lakes Dredge & Dock Co. and George H. Flynn, nationally known contractors, who pooled their resources to form Bayonne Associates, Inc., to carry out this naval contract. The first-named member of Bayonne Associates is the owner of the largest diesel-electric dipper-dredge afloat, the Crest, built in 1926 and equipped with six dipper handles from 60 to 90 feet in length for 16 and 8-yard dippers.

After a long record of service of four years on the widening of the Cape Cod Canal between 1932 and 1937 for the U. S. Engineer Department, the Crest began excavating a series of great drydocks in August, 1940. It excavated the Norfolk, Va., drydock between August, 1940, and February, 1941; a rock channel at Chester, Pa., in February and March, 1941; then moved into Bayonne on May 20, 1941, completed its work there September 15, 1941, and was towed to Brooklyn, N. Y., to carry on its deep-dredging service for two other large naval drydocks.

The Dredge and Crew

The Crest consists of a steel barge 167 feet long, 48 feet wide and 14 feet deep, with a wooden belting from the deck to below the water line. It has a draft of 12.5 to 13 feet when being towed, and is equipped with two forward spuds and one stern spud. Each spud is 51 inches square and 96 feet long, made of cast steel with reinforced diaphragms every 7 feet. The stern spud is carried in a slot in the hull and in the top of the frame to permit the spud to trail when the dredge moves ahead, so as to keep it on range. The lower end of each spud is a cast foot 11 x 12 feet with a 16-inch shaft running into the spud. The feet weigh 15 tons, and the spuds complete weigh 63.8 tons each.

The boom is 65 feet long and weighs 130 tons, while the 90-foot handle for the 8-yard bucket weighs 41.6 tons. The dredge complete weighs 2,300 tons. The Crest requires a crew of 35 men when

(*Concluded on page* 34)

Build Snow Removal Into County Highways

C. A. Speathe, Engineer, Jones County, Iowa, Plans 3-Year Program Ahead; Does Much On Small Budget

✦ JONES County in east central Iowa has an assessed valuation of only $25,000,000 and only two towns of any size, Anamosa, the county seat with a population of 3,000 and Monticello of 2,000, yet its entire county trunk highway system of 100.2 miles is graveled or surfaced with crushed rock and its recently completed 3-year program has seen wide-spread improvement in the entire system.

Building to Standards

Jones County has an area of 576 square miles and in addition to its county trunk system of 100.2 miles it has a secondary or township system of 763.4 miles in direct charge of the County Highway Department which both constructs and maintains the highways, as there are no township roads as such in Iowa. There is no hard surfacing on the trunk system, but every foot of it is graveled or surfaced with crushed rock. At the beginning of 1941, 326.4 miles of the local system had been graveled or stone-surfaced and of this 146.0 miles had been built to permanent grade. In Jones County, permanent grade means not less than 66 feet right-of-way with a 24 or 26-foot roadway graded by contract or by county equipment and with a shoulder on a 2 to 1 slope meeting a 1½ to 1 backslope to form the ditch. The backslope is now being changed to 2½ to 1 and even 3 to 1 to streamline the cross section of the road at the same time that the grade of the road is being raised so that snow removal is really being built into the county roads.

It is further a policy of the county never to gravel a road the same year it is graded unless grading is completed very early in the season and there is considerable traffic using the road. Then if a gravel contract is let late in the year

(*Continued on page* 10)

C. & E. M. Photo
Dwight Pulver, Master Mechanic, doing a cutting job at the Jones County Maintenance Shop in Anamosa, Iowa.

N. A. JUN 29 1943

Shasta Concreting Progressing Rapidly

An Elaborate Cableway System and New Methods In Bucket Handling Speed Work on Giant Dam

By HENRY W. YOUNG

✦ SINCE July 8, 1940, concrete pouring has been underway at Shasta Dam, the largest feature in the Central Valley Project in northern California. Of the 6,000,000 cubic yards of concrete required for the structure, over 2,400,000 have now been placed, representing excellent progress on the principal phase of the world's second largest concrete dam being built by the U.S. Bureau of Reclamation for navigation improvement, flood control, irrigation, salinity control, and power.

Cableway System

Probably the outstanding feature of the concrete-placing plant is the structural steel head tower 460 feet high, with seven 20-ton Lidgerwood cableways radiating from it. Operating in connection with traveling tail towers, controlled from the head tower, those cableways provide coverage of the entire dam, spillway and power house. The longest span is 2,680 feet, and approximately 60 per cent of the dam concrete will lie under the three longest cableways.

The hoists for the cableways are mounted 260 feet above the ground on a hoist floor framed into the head tower. Track cable connections are made at the top of the tower through large gudgeon pins.

The total weight of the tower is approximately 4,000 tons. From cap girder to hoist floor, the upper part of the tower is enclosed with 16-gage corrugated galvanized sheet steel. Twelve feet above the hoist floor are located the operators' stations, providing each operator with complete visibility not only of his hoist but of the whole area covered by his cableway and of the bucket dock.

Cableways No. 1, 2 and 3 are almost on a level, but the other four are at vertical angles, requiring different gearing on the hoists to accomplish the 20-ton pull up what is in effect a steep hill. On the steepest one, No. 6, the out-haul is designed for gravity, power being applied for the in-haul. This is but a short span, only 729 feet, and the in-haul is two-parted by means of a pulley.

Batchers and Mixing Plant

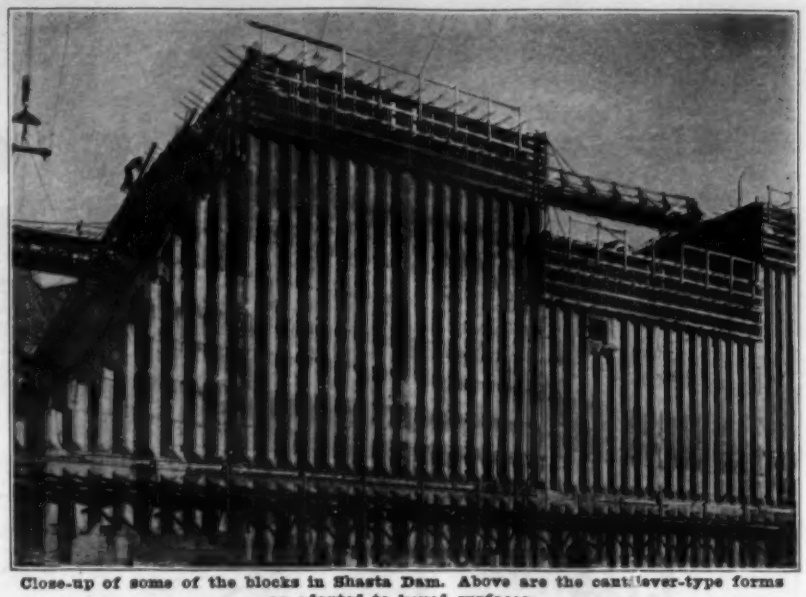
The aggregates are transported to the mixing plant by conveyor from live storage 4,000 feet downstream from the dam and consist of sand; fine gravel, 3/16 to ¾-inch screen; intermediate gravel, ¾ to 1½-inch screen; coarse gravel, 1½ to 3-inch screen; and cobble, 3 to 6-inch.

Five Koehring 4-yard mixers are concentrically placed and are served by a standard C. S. Johnson automatic batching system equipped with Kron dial scales. One of the mixers is provided with a special chute and can be used for mixing special concrete for the power house or any other special requirements. Two and a half minutes is specified for the mix and operation is on a 2¾-minute cycle.

Types of Buckets Used

For placing concrete in the dam, 8-yard square buckets are used. These are never unhooked from the cableways, but are swung onto the docks and filled from that point by the method described below.

Each square bucket has bottom gates that are opened by means of a special line by the cableway operator when ready to dump. However, he can not open the gates and dump the load until a lock on the gate mechanism has been released by a rope pulled by one of the men in the pit.



Close-up of some of the blocks in Shasta Dam. Above are the cantilever-type forms as adapted to keyed surfaces.

For concrete on the power house, special round pick-up buckets of the bottom-dump type, manually released by a wheel and gear mechanism, are employed and are loaded on cars on a separate track from that serving the dam buckets.

"Geese" And How They Operate

Electric cars, operated on a d-c third-rail system, run on a circular track passing beneath the mixers. On each car are two 8-yard containers of a type designed for this job.

The container or "goose," as it is called, is shaped inside like a cone with one side sliced off. At the apex, and on the side, so that it clears the side of the car, is a chute with a special gate, which is positively operated by a compressed-air ram.

The loaded car draws up beside one of the bucket docks on which a bucket is waiting, the gate is opened by the ram and the eight yards of concrete are discharged into the bucket almost instantaneously. Three cars, each carrying two "geese," operate in the main track. Each car with its 16-yard load will serve two cableway buckets.

The system is operated by direct current and the contractors equipped their own cars, utilizing the trucks and motors of inter-urban electric railway cars, on which the containers were mounted.

The scheme is new and is a considerable time saver, there being practically no loss of time at the docks. It is estimated to save about 2 minutes on the round trip over placing buckets on the cars, unhooking them and then hooking on again with the cables.

The power-house mixer with its dual-

(Concluded on page 44)

C. & E. M. Photo

The big muck hole at Sta. 56 where Gammino pushed tons of ledge rock over the edge as the base for the highway fill.

Muck, Boulders, Ledge Featured U. S. 44 Job

(Photo on page 48)

Four Miles of Relocation On Six-Mile Contract of Gammino Const. Co., from Eastford to Pomfret, Conn.

✦ DURING 1941, the State of Connecticut improved 6 miles of U. S. 44, a main east-west highway, between Eastford and Pomfret by improved subdrainage, relocation to eliminate the multiplicity of curves, and a new 28-foot bituminous-macadam pavement, including 1-foot bituminous lip curbs on each side. The contract for the grading, drainage, structures and paving, was awarded to M. A. Gammino Construction Co. of Providence, R. I., on the bid of $359,940.91.

Clearing and grubbing was started early in April, 1941, with hand labor and one shovel. The plan of operation of the job was to build the three largest structures in the first half mile at the east, or Pomfret, end of the job as soon as possible, so the contractor concentrated on the excavation for these three structures first. At the same time, however, all of the stripping was completed in the first week. The clearing was very heavy and through a state park between Sta. 18 and 48. Then the rock drilling equipment was started at the east end, drilling all boulders and ledge, and blasting it at once. Following the arrival of the excavating equipment it was started at the west end, working back, followed by the placing of the gravel sub-base, base stone for the bituminous macadam, and the surface. This procedure left ample time to complete the major structures without interference.

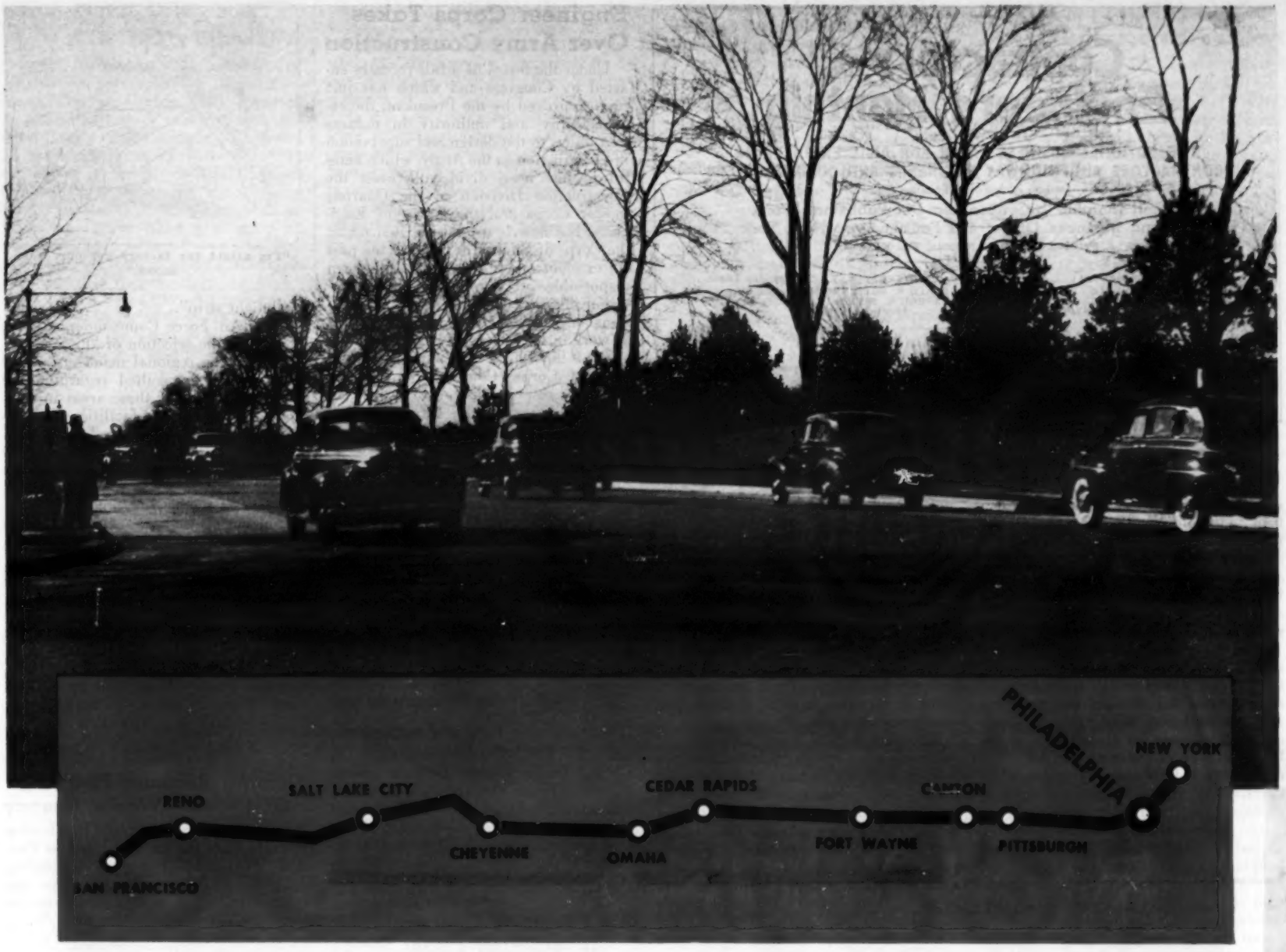
The job starts at the west end with Sta. 0+00 and runs eastward to Sta. 310+00, skipping 1,300 feet near Sta. 235 where a 40-foot bridge was built by another contractor.

(Continued on page 18)

The battery of five 4-yard Koehring mixers which are mixing the concrete for Shasta Dam.

C. & E. M. Photo

One of the I-R wagon drills which did the major part of the drilling on the big rock grading job of M. A. Gammino on U.S. 44 between Eastford and Pomfret in Connecticut.



Lincoln Highway traffic flows into Philadelphia

on *resilient* TEXACO

The Lincoln Highway holds a place in American history, along with the Santa Fe Trail and the Oregon Trail. Follow this great coast-to-coast route from New York City to San Francisco and you will drive through 12 States—and numerous important, bustling cities.

Largest and busiest of the cities encountered en route is Philadelphia. City Line Avenue is Philadelphia's link in the Lincoln Highway and traffic on this thoroughfare is heavy 24 hours of the day.

Under the hard, sustained wear received on City Line Avenue, a resilient TEXACO Sheet Asphalt pavement is demonstrating its ability to "take it" hour after hour, day after day, month in and month out. Examples of Texaco durability such as this explain why 1500 representative U. S. municipalities have laid TEXACO Asphalt paving, including most of the country's largest cities.

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Substitutes for Use for the Duration

Substitution is rapidly becoming the order of the day. Our cook has gone back to the old iron frying pan since the much better looking aluminum pan was gathered in during the aluminum-for-defense drive, while the research chemists are developing new materials, such as plastics, to take the place of materials essential to the war effort.

And so, in construction, we must face an increasing number of substitutions in the materials used in our field, because of priorities for the defense program and the depletion of stocks. In many cases, it will not be a matter of going back to an older material, but rather to new alloys and products which are being developed and which have certain advantages over their older prototypes.

The word substitution has generally an unpleasant connotation. To most people it suggests something not as good as the original product. The Germans with their "ersatz" (which literally means compensation or amends) have added to this general impression. We have had many tales of their substitute lubricants, with resulting breakdowns of equipment, of substitute metals which will not stand up under severe service, and accordingly during the past few years we have, from our land of plenty, been rather scornful of substitutes.

Now we are faced with shortages—shortages of steel, nickel, rubber, aluminum—and in order to carry on we must find substitutes for some of these materials in some of our fields of production. By dictionary definition, substitute means one thing put in place of or acting for another. There is nothing to suggest that the substitute is not as good or as effective as the original, and our first step in this necessary program of accepting new products for use in place of accustomed ones is to clear our minds of any feeling that a substitute is necessarily inferior. American scientists, chemists and research workers are the finest in the world, and there have been developed in the past fifty years a staggering number of "substitutes" which we have accepted as useful and superior products to those used formerly. Now, under the pressure of necessity in the major effort of the defense program, other new products are being developed which will be just as effective, if not better.

For example, one chemical manufacturer has announced a new machine finish, made with a synthetic resin base, which offers greater durability than oil or varnish-type enamels where contact with oil, grease or other solvents, wide temperature variations and abrasion all tend to shorten the life of the finish.

Another manufacturer is preparing to serve the market if zinc and galvanizing spelter, as well as lead and aluminum paints, become unobtainable. Black iron sheets might necessarily be substituted for galvanized iron sheets, and must be covered with a satisfactory protective coating. This manufacturer calls attention to two coatings which have withstood the test of time on structural steel, machinery and the under-frames, bottoms and ends of freight cars.

Thus we are not to suffer too greatly in the reduced availability of some materials to which we are accustomed, but can turn to others, some new, some tried in other fields, some old but with refinements and new applications. Research and production go hand in hand to carry us forward, in spite of increasing emergency demands.

Manufacturers of many products and materials are naturally worried over the loss of a market because of the absorption of their product for defense needs; but their solution lies in substituting for a virile sales campaign the cultivation of their customers through goodwill advertising, even though at the moment the manufacturer may not be able to serve them because of the demands of defense production. When this period of defense production ends, much of the business will return to the manufacturer who has a needed product and who has kept his name before potential purchasers.

Consumers in the construction field—contractors, state, county and Federal engineers—must study their present needs, the available standard materials, and the possible necessary substitutions which must be made in coming months. Through our editorial columns, we shall bring to your attention new materials and products which are developed to replace or can be adapted to the needs of the field, releasing the materials needed for the Victory program. In this program, members of the construction industry can help most by the adoption of an open mind about these new products, a willingness to try something new, and last but by no means least, by using their own ingenuity and inventiveness in developing for themselves ways and means of conserving the equipment they have and of substituting more readily available items which can do the job just as well, if necessary.

Plan, study, and make the best choice possible among available materials for service, durability and strength. The construction industry still has a big job to do, and it will do it, despite shortages, priorities, allocations and any other difficulties, because the skill, ingenuity and integrity of the industry which have contributed so much to the progress of this country in the past will surmount any obstacles the present or the future may hold.

Engineer Corps Takes Over Army Construction

Under the terms of a bill recently enacted by Congress and which has just been approved by the President, the responsibility and authority in matters pertaining to the design and supervision of construction in the Army, which heretofore has been divided between the Construction Division of the Quartermaster Corps and the Corps of Engineers, has now been consolidated under the Corps of Engineers. During the past six or eight months, the latter has been responsible for the design and supervision of construction at Air Corps Stations and, as previously, has had charge of work in the Rivers and Harbors Division of the Corps of Engineers, while the QM Corps' Construction Division has been responsible for the construction at military stations such as camps, cantonments and other military establishments.

It has been announced that for the present, at least, the personnel of the Construction Division of the Quartermaster Corps will continue to function as they have in the past, merely being transferred to the Corps of Engineers. Brigadier General Thomas M. Robins, who is in charge of the Construction Division of the Corps of Engineers, will continue to direct the combined construction organizations of the Corps of Engineers and the old Quartermaster Corps.

As a result of this change, Army construction will be very much more decentralized than formerly. Most of the authority has been delegated to U. S. E. D. Division and District Offices throughout the country, which offices will advertise for bids, let contracts and supervise construction. There are eleven Division Officers and fifty-one District Offices of the Corps of Engineers located at strategic points in the United States.

Air Forces to Cooperate In Building Flight Strips

Announcement has been made by the War Department that Army Air Forces will cooperate with the Commissioner of Public Roads in the selection of locations and the construction of "flight strips", which was authorized by the Defense Highway Act of 1941. These "flight strips" are auxiliary landing areas for the use of service-type aircraft, built adjacent to public highways.

The construction of "flight strips", for which $10,000,000 was appropriated by the Act, will involve little more than widening the highway rights-of-way or the use of roadside development areas and the establishment of a definite line of demarcation between the highway and the "flight strip".

"I'm afraid the factory got our order mixed."

Each Air Force Commander will cooperate in the selection of "flight strip" areas and the regional managers of the CAA will be consulted regarding the general location of these areas in relation to other landing facilities. In general, military "flight strips" will be located within a radius of from 5 to 50 miles from air bases and will serve as auxiliaries to those bases. Runways will be laid out in the direction of the prevailing wind when possible, and this will have a vital bearing on the selection of sites.

Since they are located adjacent to existing highways and regular highway equipment will be used in their construction, "flight strips" should make possible the development of needed aviation facilities at a minimum cost. Construction costs will be paid by Federal funds, while the states will maintain the "flight strips" in conjunction with the Federal-Aid highway program.

Fleming Becomes Head Of Federal Works Agency

Brigadier General Philip B. Fleming recently took the oath of office as Federal Works Administrator, succeeding John M. Carmody who has been appointed to the U. S. Maritime Commission. Before assuming his new duties, Gen. Fleming was Administrator of the Wage and Hour Division, U. S. Department of Labor.

In his first public statement as Administrator, Gen. Fleming declared that defense housing, public works and *defense roads* are war measures and urged that they be placed on a maximum production basis at once. In his telegram to field personnel, Gen. Fleming said:

"Defense housing, public works and defense roads are war programs. They must be prosecuted to the utmost limit. Production must be put upon a maximum basis at once. The President has told the nation that it must speed up all existing production and that on the road ahead there lies hard work—gruelling work—day and night, every hour and every minute. Every organization in the Federal Works Agency, every contractor and worker on FWA projects and every employee on FWA in and outside Washington must do everything within human power to speed construction, to speed contracts and to speed to the earliest possible completion the facilities that are so critically needed."

Standards on Petroleum Products and Lubricants

The Sixteenth Edition of the A.S.T.M. Standards on Petroleum Products and Lubricants, issued recently, provides in compact form all of the test methods, specifications, definitions and charts developed through the work of the American Society for Testing Materials Committee D-2 on Petroleum Products and Lubricants. The 1941 book also includes sixty-nine methods of testing, eleven specifications, and two lists of definitions of terms.

Copies of this 400-page book in heavy paper binding can be secured from the American Society for Testing Materials, 260 So. Broad St., Philadelphia, Penna. Price: $2.00 a copy.

AMERICAN ROAD BUILDERS' ASSOCIATION
THIRTY-NINTH ANNUAL CONVENTION
March 2-4, 1942
at the Hotel Peabody, Memphis, Tenn.

Highways in our war effort will be the keynote of this meeting of Highway Contractors, State and County Highway Engineers and Officials, Municipal Engineers, Educators and Planners, Pan American Highway Engineers and Manufacturers.

There will be only one session at a time, beginning on Monday afternoon, and the tentative list of speakers includes high-ranking Army officials and others who are playing an important part in highway matters from a military standpoint. Be sure to attend.

Union Metal Celebrates Its Thirty-Fifth Year

In the November, 1941, issue of *The Monotube,* published by the Union Metal Mfg. Co., Canton, Ohio, appeared an anniversary story of the growth and development of that company. It started 35 years ago in an idle broom factory on the site of the present plant in Canton and the first product was architectural columns of steel, a decided innovation at a time when practically all porch columns were of wood or concrete. In 1907 street-lighting standards were added to its line.

In 1925 C. A. Orr, who had had a long record in the steel industry, joined the company as General Manager and the following year became President, an office which he still holds. During this period, the major development by the company was the introduction of heavier steels and the company's principal product, Monotube poles and piling, was announced.

In the late 1920's experimental piles were made and offered to a railroad company which was building a new bridge near the plant. Monotube piling is tapered and made of various gages of heavy steel. Single piles can be formed up to 40 feet in length, and longer piles are obtained by welding extensions to the upper end. In this manner, piles up to 125 feet have been driven.

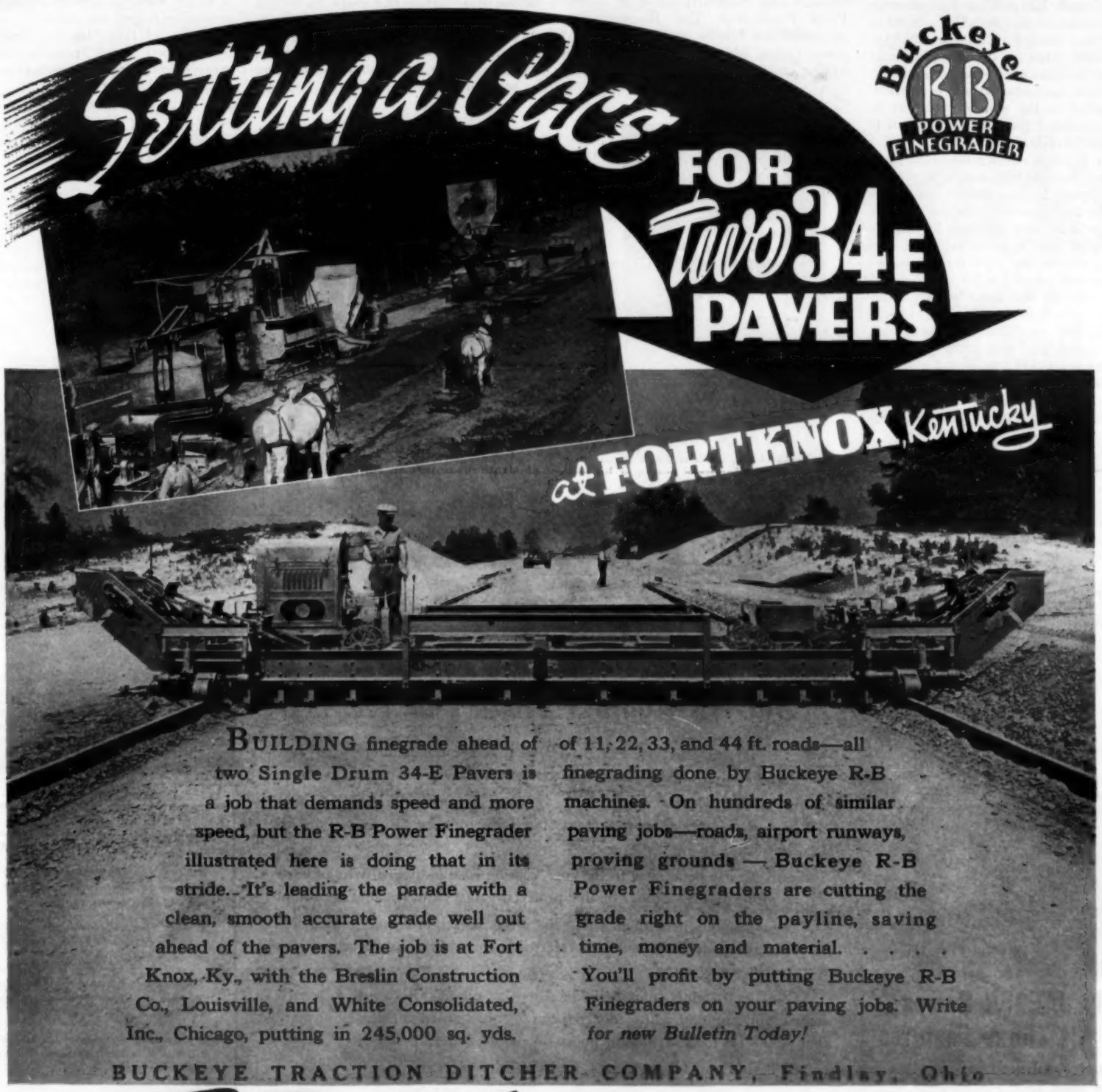
In 1938 steel floor bridging, now widely used in defense cantonments, was introduced. The company is proud of its share in defense production, since its products serve defense needs in themselves and in addition the company is producing 1,000-pound practice bombs for the Navy, makes numerous castings for other defense plants, and expects shortly to add still more defense duties to its activities.

New Roebling Branch Mgr.

The John A. Roebling's Sons Co., Trenton, N. J., announced recently the appointment of Eugene King, former Assistant Manager, to the position of Manager of its Cleveland Branch, succeeding Raymond R. Newell who retired. Mr. Newell had been associated with the Roebling Company for 39 years and in charge of the Cleveland organization since 1911.

Kotal Acquires Method Of Aggregate Treatment

Announcement has been received from the recently-organized Kotal Co., 52 Vanderbilt Ave., New York City, headed by Howard B. Bishop of Summit, N. J., that it has acquired the business formerly conducted by the Asphalt Treatment Corp., 140 Cedar Street, New York. Kotal Co. manufactures a waterproofing agent for use on aggregates employed in asphalt highway construction and maintenance. Associated with Mr. Bishop in the management of the Kotal Co. are Herbert P. Pearson, in charge of Production and Research, the same positions he held in the Asphalt Treatment Corp., and Charles H. Welling as General Manager.

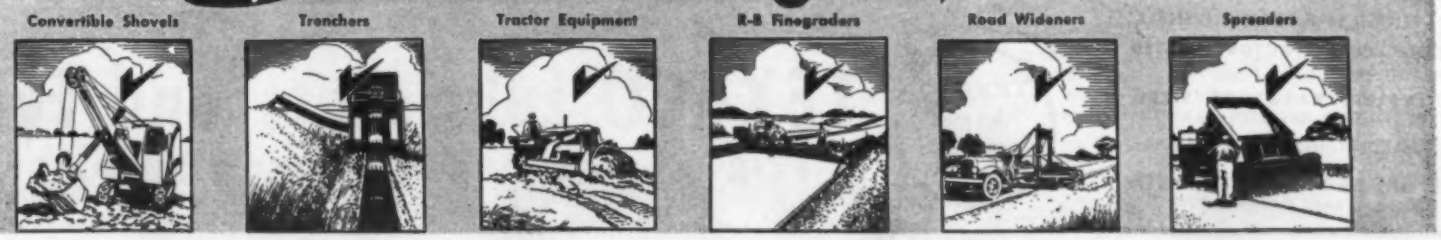


BUILDING finegrade ahead of two Single Drum 34-E Pavers is a job that demands speed and more speed, but the R-B Power Finegrader illustrated here is doing that in its stride. It's leading the parade with a clean, smooth accurate grade well out ahead of the pavers. The job is at Fort Knox, Ky., with the Breslin Construction Co., Louisville, and White Consolidated, Inc., Chicago, putting in 245,000 sq. yds. of 11, 22, 33, and 44 ft. roads—all finegrading done by Buckeye R-B machines. On hundreds of similar paving jobs—roads, airport runways, proving grounds — Buckeye R-B Power Finegraders are cutting the grade right on the payline, saving time, money and material. . . . .

You'll profit by putting Buckeye R-B Finegraders on your paving jobs. Write *for new Bulletin Today!*

BUCKEYE TRACTION DITCHER COMPANY, Findlay, Ohio

Built by Buckeye



The Pacific rock bit grinder.

Gas-Driven Grinder For Rock Drill Bits

A new self-contained gasoline-driven portable rock bit grinder has recently been announced by the Alloy Steel & Metals Co., 1862 E. 55th St., Los Angeles, Calif. This Pacific G-8 grinder is designed for four-way detachable bits up to 3 inches in diameter and is particularly suited to the smaller jobs or to those so isolated that electric current is not readily available.

Power is supplied by a standard four-cycle gasoline engine, developing 1 hp at 2,200 rpm. It is air-cooled, equipped with a fly-ball governor control and air cleaner, and is fully enclosed for safety. The Pacific G-8 is provided with two grinding wheels, the right hand one being a special wheel for bit grinding to be used only for this purpose, while the left-hand wheel is for general utility grinding. The manufacturer states that with this unit the correct taper on cutting edges is quickly, easily and economically obtained, while the clearance taper back of the cutting edges may be controlled to suit the type of ground being drilled.

In addition to the Model G-8, there are a number of other Pacific grinder models available, details on all of which will be found in Bulletin No. 111. Copies may be secured by those interested direct from the manufacturer or from this magazine.

New Kinney District Mgr.

Announcement has been made by the Kinney Mfg. Co., Boston, Mass., of the appointment of Harold G. Saunders as Manager of Kinney's Philadelphia Office, replacing C. D. Campbell, Jr., who resigned. Mr. Saunders has had 22 years' experience as District Manager for Kinney at Kansas City, Mo., and more recently in Dallas, Texas. Henry A. Perry, Jr., of the company's Boston office, replaces Mr. Saunders in Dallas.

Traffic Stripe Paint For Use on Highways

One of the most important safety factors on our highways today is the center and warning traffic stripe. Thus traffic paint is playing a vital part in safety programs being stressed throughout the country.

In order to study the problem of traffic paint and the qualities necessary to provide durability, ease of applying, clear distinct permanent color, etc., the Baltimore Paint & Color Works established the Gleem Bureau for the Development and Standardization of Traffic Paint Production. This Research Department set out to make a study of every factor which enters into the behavior of traffic paints, including abrasion resistance, weathering influences, gasoline and alkali resistance, ease of working in application, film thicknesses, settling, elasticity, reflection, pavement compositions, underground moisture, and every other known contributing factor. Special machines and methods of tests to simulate actual road conditions were devised.

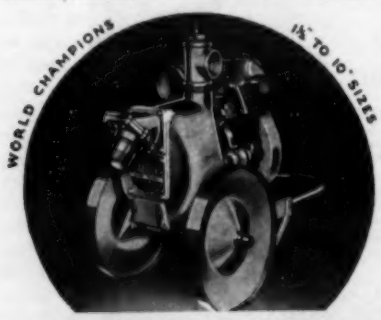
As a result of the information thus acquired, this company manufactures two types of traffic paint, Gleem municipal traffic paint for use in cities and towns and Gleem highway traffic paint, especially controlled so as to flow or spray satisfactorily when used in motorized traffic stripers. It is said to give as durable a film on concrete or brick as on bituminous surfaces, providing a tough adherent film which does not change color or bleed.

An interesting booklet, describing the Research Department's work in testing various types of traffic paints and describing in greater detail Gleem highway traffic paint, which is available in white, medium yellow, orange and black, may be secured by state and county highway engineers direct from the Baltimore Paint & Color Works, Inc., 148-156 So. Calverton Road, Baltimore, Md., by mentioning this item.

New Booklet on Wrenches

To help the many new wrench buyers and users, the Blackhawk Mfg. Co., 5535 W. Rogers St., Milwaukee, Wis., has published recently a 48-page booklet called the "Handy Guide". It is profusely illustrated and describes socket, box-type, specialty and torque indicating wrenches, their uses and new features. Standard socket wrenches, it is claimed, build into almost any desired combination for assembly and maintenance. A Blackhawk socket with a ¾-inch opening has a wall thickness of only .0615-inch, making it possible for it to be used in places frequently inaccessible to jaw wrenches.

Copies of this "Handy Guide" may be obtained direct from the manufacturer by mentioning CONTRACTORS AND ENGINEERS MONTHLY.



Only JAEGER Pumps Have All These Features

- **JAEGER PRIMING JET** — Up to 5 times faster prime and re-prime — no adjustments, no need to "gun" engine.
- **POSITIVE RECIRCULATION CUT-OFF** — controlled by flow, not pressure.
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- **PATENTED SELF-CLEANING SHELL**
- **EVERY PUMP FACTORY TESTED** for high capacity and pressure.
- **COMPLETE RANGE OF SIZES, TYPES** — 3,000 to 240,000 g.p.h.

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THE JAEGER MACHINE CO
181 Dublin Ave., Columbus, Ohio

More Service from Your Wire Rope Dollar

Protection Against Wear and Weather

THIS is no time to have to replace wire rope because of undue wear, rust or corrosion. Today, with the scarcity of materials, every productive hour counts double.

You can get longer service from your wire rope by protecting it with *Texaco Crater.*

Texaco Crater penetrates to the core, coating each individual wire of each strand with a highly viscous film that protects against wear, rust and corrosion.

The outstanding performance that has made Texaco preferred in the fields listed in the panel has made it preferred on prominent construction jobs throughout the country.

These Texaco users enjoy many benefits that can also be yours. A Texaco Lubrication Engineer will gladly cooperate . . . just phone the nearest of more than 2300 Texaco distribution points in the 48 States, or write:

The Texas Company, 135 East 42nd Street, New York, N. Y.

MAKES GEARS LAST LONGER, TOO

Texaco Crater clings to gear teeth, cushioning load shocks, preventing metal-to-metal contact, deadening the noise. Doesn't channel, ball up, or throw off.

THEY PREFER TEXACO

★ More locomotives and cars in the U. S. are lubricated with Texaco than with any other brand.

★ More revenue airline miles in the U. S. are flown with Texaco than with any other brand.

★ More buses, more bus lines and more bus-miles are lubricated with Texaco than with any other brand.

★ More stationary Diesel horsepower in the U. S. is lubricated with Texaco than with any other brand.

★ More Diesel horsepower on streamlined trains in the U. S. is lubricated with Texaco than with all other brands combined.

FOR YOUR ENJOYMENT • TWO GREAT RADIO PROGRAMS

FRED ALLEN every Wednesday night. See your local newspaper for time and station.

METROPOLITAN OPERA. Complete broadcasts of great operas every Saturday. See your local newspaper for time and station.

TEXACO

TEXACO Lubricants and Fuels FOR ALL CONTRACTORS' EQUIPMENT

RETURN METAL DRUMS PROMPTLY . . . thus helping to make present supply meet industry's needs and releasing metal for National Defense

Sand—Coquina—Tar Make Stable Runways

Marion Contracting Company Converts Unstable Sand of The St. Augustine Airport Into Hard, Stable Base

✦ THE St. Augustine, Florida, Municipal Airport, 4 miles north of St. Augustine on U.S. 1, is one of the 200 in the United States being improved by the Civil Aeronautics Authority, with the U. S. Engineer Department furnishing the supervision of construction. The original contract awarded to the Marion Contracting Co. of Ocala, Fla., for the improvement of the airport included two 2,600-foot-long x 100-foot-wide runways oriented N to S and E to W. This contract was later extended to include the lengthening of the N-S runway to 4,000 feet and the E-W runway to 3,000 feet, and widening the N-S runway to 150 feet. Included also was the addition of a new NE-SW runway 3,000 feet long x 100 feet wide, and the construction of the required taxiways.

Excavation

The required stripping was done with a Bucyrus-Erie B-20 ¾-yard dragline, which was also used on regular excavation. A P & H 400 dragline was also used on excavation, with 22 dump trucks doing the hauling.

Stabilizing with Coquina

Coquina is a common deposit of small shells, found in Florida and Georgia, which is frequently used in asphalt mixes as aggregate with sand. In the stabilization of the runway areas at the St. Augustine airport, the entire area to be worked on any one runway was stabilized before any windrowing was done for mixing. A layer of 3 inches of coquina was spread over the entire area of natural fine sand, and then plowed in 12 inches deep to furnish the material for a 6-inch stabilized subgrade and 6 inches for the tar-mix base. The plowing was done with a Hester disk plow pulled by a Caterpillar D6 or D7. Following the complete mixing of the coquina and sand, the top 6 inches was made up into eight windrows for a 150-foot width of base, using an RD7 pulling a Caterpillar 66 power-controlled grader and hand dressing. These windrows were made 9 feet wide at the base, so as to fit the 10-foot wing of the Barber-Greene traveling mixer used.

Mixing Base With Tar

The mixing of tar at the rate of 2.8 to 2.9 gallons per square yard 6 inches thick was done by a Barber-Greene 62A traveling mixing plant moving at 32 inches per minute. The tar to supply the 700-gallon tank on the B-G machine was hauled from Jacksonville by the contractor, using three 2,500-gallon transfer trucks, and delivered to a 10,000-gallon storage tank at the airport. From this, two 650-gallon tank-trucks delivered the Koppers tar to the traveling mixing plant.

The crew handling the operations around the mixing plant consisted of three men dressing the windrow, two wing men in front of the mixing unit, who also attached or detached the tar line when a tank-truck arrived or had delivered its load, an operator and an oiler for the plant, one clean-up man on either side, and four extra laborers at the discharge end when the machine was mixing extra material for turn-arounds or other purposes.

A second Barber-Greene traveling mixer, Model 39, was maintained at the airport by the contractor to mix the large volume of extra material needed for the turn-arounds and taxiways. This machine operated in areas where the sand could be readily stabilized, windrowed and then mixed and delivered to trucks to be easily moved to the section where it was laid.

C. & E. M. Photo
The Barber-Greene traveling mixer working on runway base at the St. Augustine Municipal Airport in Florida.

Spreading and Finishing

The mixed windrows were broken down and spread with a Caterpillar Forty tractor equipped with a Bucyrus-Erie bulldozer. The mix was then thoroughly worked over and aerated, using a Killefer 22-disk harrow pulled with the Caterpillar Forty; and this aerating and spreading was continued with the

(*Concluded on page* 39)

The Original BucketruX

Trade DEMPSTER DUMPSTER Mark

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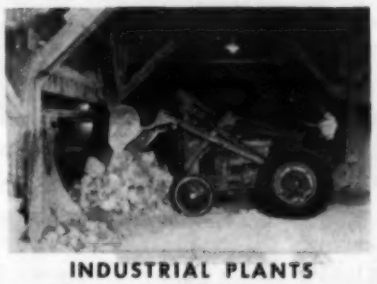
Mfgd. by

DEMPSTER BROTHERS, Inc.

Knoxville, Tenn.

Down *at the* Docks

..in Factory or on the Road

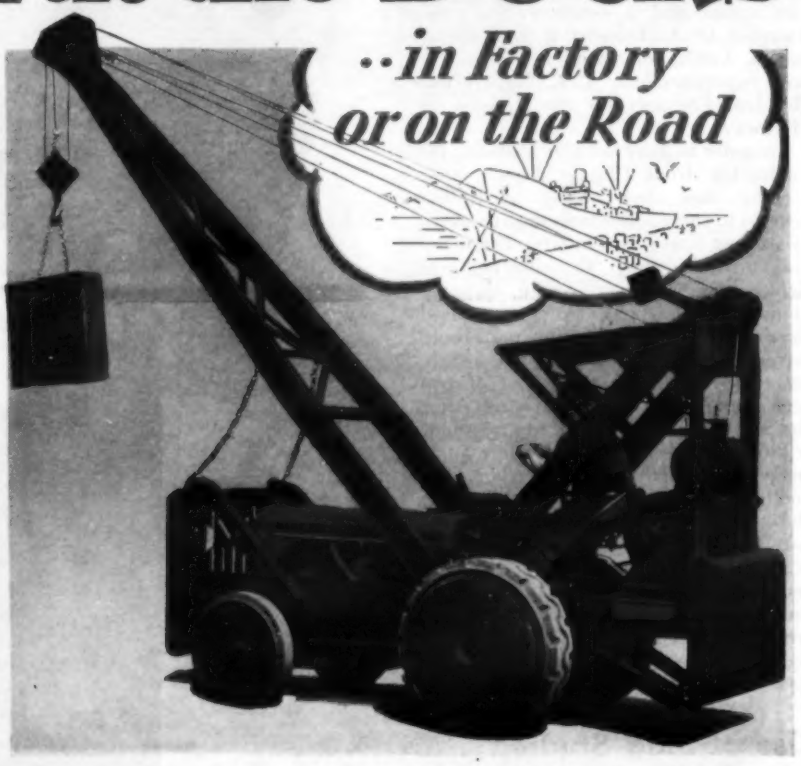


INDUSTRIAL PLANTS

Handling chunk alum from storage yard to conveyor belt is one of hundreds of production jobs where Case protection against dust makes tractor life longer, upkeep lower.

CONTRACTING

Compactness and quick maneuvering, plus fast hauling speed, cut time and costs in earth-moving. Power take-off correctly located provides for mechanical or hydraulic controls.



AIRPORTS

Well-groomed grounds and landing areas are easier to maintain with a nimble "VI" tractor and power-lift mower. Versatile Case power also does towing, surface maintenance, etc.

ROAD MAINTENANCE

Mobility plus unlimited crowding range makes a Case-powered loader well suited to scattered jobs and materials. Several makes, types and sizes of loaders match varying conditions and tractor models. There are also mowers, sweepers, maintainers, and many snow plows.

"JOB-PROVED" POWER *Sees Things Through*

When national need demands that replacements and repairs be held to a minimum, there is new meaning in the long life and low upkeep for which Case tractors are known. The same durability and dependability which conserve metals and manpower are your best assurance of getting your work done surely and promptly.

Such durability and dependability cannot be created in a hurry. They come from experience that began when Case built the world's first gas tractor of record 50 years ago, plus 100 years' experience in building other out-door machinery. Today's fresh tractors for industrial service are built in four sizes, with wide choice of wheel and tire equipment to give an unbroken weight range from 2400 to more than 11,000 pounds. Many kinds of mounted equipment, specially designed to work with them, are available through your Case distributor. J. I. Case Co., Racine, Wis.

★

Large picture shows a Mercer double-drum crane. Built also in single drum style, and in sizes for both "DI" and "LAI" tractors, these cranes are used for moving heavy items in docks and plants, loading ships and cars.

CASE

Armco 12-gage interlocking sheeting forms a cofferdam for the Kern River Bridge near Bakersfield, Calif.

Steel Sheeting Used For Pier Cofferdams

To take care of increased traffic, the California Division of Highways recently added to traffic facilities over the Kern River, between Bakersfield and Oildale, in Kern County, by constructing a new bridge carrying two lanes of traffic which will supplement the old bridge which also carries two lanes, thus providing a four-lane divided roadway. The contract for this new composite steel and concrete stringer bridge with twenty-two spans and a concrete deck was awarded to A. Teichert & Son, Sacramento, Calif., for whom I. F. Lindsay was Superintendent. A. K. Gilbert was Resident Engineer for the Division of Highways.

In order to pour the pier footings, the contractor drove 12-gage Armco interlocking steel sheet piling in 10-foot lengths to form cofferdams approximately 32 feet x 4½ feet in size. The material through which the sheeting was driven was coarse sand with an occasional gravel streak which increased driving difficulties. An Ingersoll-Rand pavement breaker with special attachments to obtain the equivalent of two men's weight was used for driving. After the sheeting was driven, two rows of 6 x 6-inch wales were used 4 feet apart inside to strengthen the cofferdam. The footings were poured with a tremie, then the cofferdam was unwatered and the forms for the piers erected.

The Armco sheeting was pulled and reused, even though of the lightest gage made (12 gage). In some cases holes were torn and the 12-gage steel was so light that the ends of some of the piling had to be dressed before reuse.

Use of Slag Studied In Paving Mixtures

In the various states which use blast-furnace slag as a road-building material, there appears to be considerable difference of opinion as to the amount of restriction which should be placed on the percentage of glassy particles in slag aggregates for bituminous paving mixtures. Glassy particles have been considered detrimental because it was feared that their smooth surface texture would impair the stability of bituminous mixtures and that the bituminous film would not adhere to them in the presence of water.

An investigation was undertaken by the Division of Tests, Public Roads Administration, to determine whether the stability and resistance to film stripping of bituminous paving mixtures prepared from slag aggregates were affected materially by the glassy-particle content of the slag. From this investigation it was concluded:

1. The susceptibility to film stripping of the mixtures containing the six slags that were tested was not affected materially by variations in the content of glassy particles.

2. For bituminous mixtures containing 0, 15, and 30 per cent of glassy particles in the fraction retained on the No. 4 sieve, the percentage of glassy material did not have a significant effect on stability.

3. The tests furnish no indication that specification requirements placing drastic limitations on the glassy-particle content of slag aggregates for bituminous concrete are necessary.

The details of the tests made and their results are given in an article in the November, 1941, issue of *Public Roads*, copies of which may be secured from the Superintendent of Documents, Washington, D. C. Price: 10 cents a copy.

Gasoline-Engine-Powered Hoists for Contractors

The line of Ideal gasoline-engine-powered hoists, which can be furnished complete with 5 or 8-hp engines, mounted and connected all ready to run with either sprocket chain drive, belt drive or direct gear drive, is described and illustrated in literature issued by the Universal Hoist & Mfg. Co., Cedar Falls, Iowa. Models for electric drive where electric current is available are also described.

The feature in the design and construction of Ideal hoists is simplicity. They are made with a reversible or non-reversible drum, and in single and double-drum models, as required. These hoists are made in two sizes, 1,200 and 2,000 pounds, with line speeds of 130 feet per minute, and are regularly mounted on a wood frame 8 feet long and 27½ inches wide. All hoists are regularly equipped with a friction brake band, and a safety ratchet brake attachment is furnished when specified, at a slight extra cost.

Literature describing and illustrating these Ideal hoists may be secured direct from the manufacturer by referring to this item.

New Rex Dealer

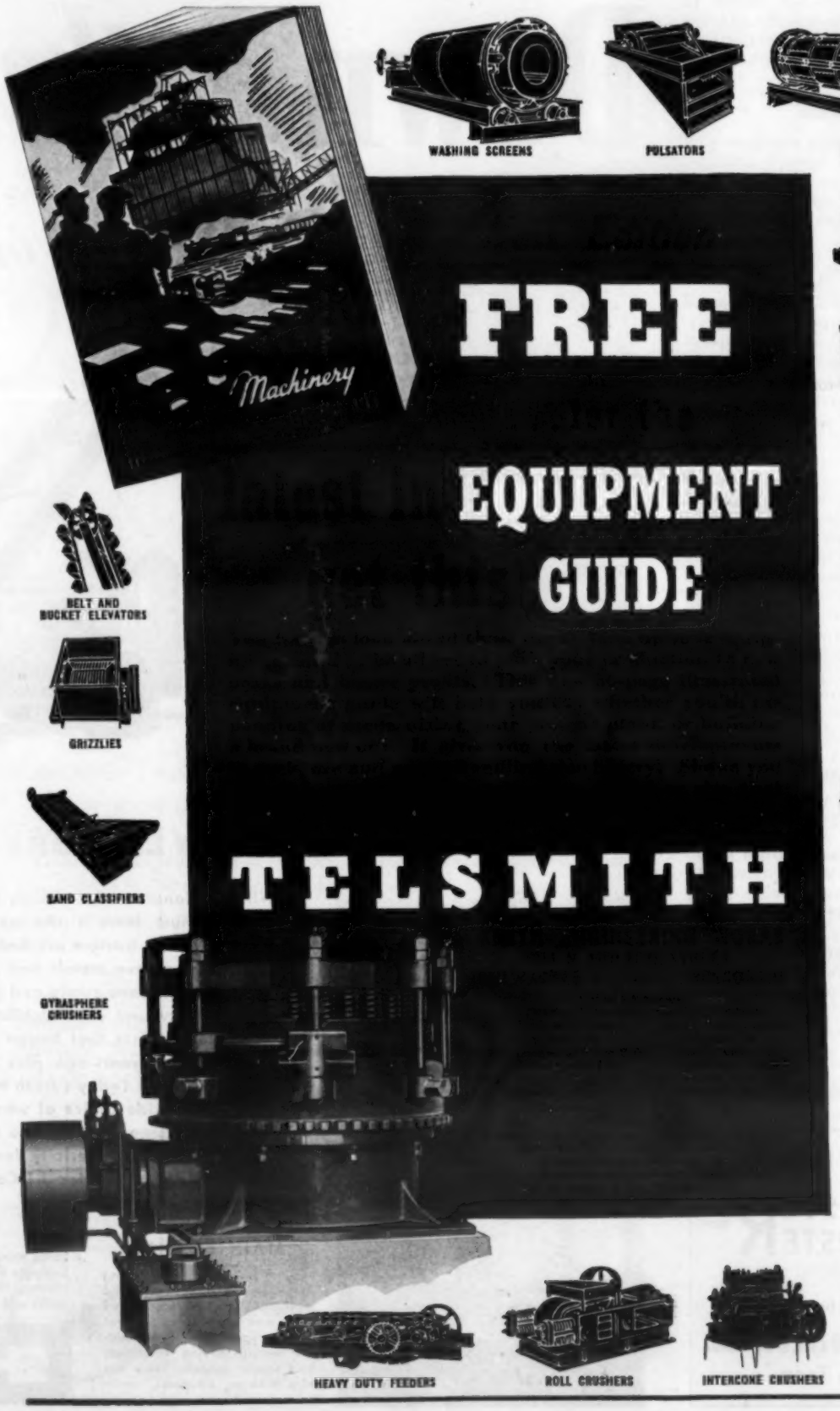
Chain Belt Co., Milwaukee, Wis., announced recently the appointment of Dow & Co., Inc., 1820 Elmwood Ave., Buffalo, N. Y., as distributor of the Rex line of mixers, pavers, Speed Prime pumps, Moto-Mixers and Pumpcrete units in the Buffalo and Rochester area.

WON'T QUIT
or cause time out

A Hayward Bucket keeps the job going ahead on scheduled time. It won't quit or cause time out.

The Hayward Company
32-36 Dey Street
New York, N.Y.

Hayward Buckets



N. J. Route Extended With Dual Roadways

Program of Safety Island Between Opposing Lines of Traffic Applied to New Section of State Route 25

✦ ONE of the longer sections of paving in New Jersey in 1941 went to Geo. M. Brewster & Son, Inc., of Bogota, N.J., for the bid price of $848,763.10. This job was 6.377 miles in length and was paved on a grade prepared last year as a State-sponsored WPA project. The contract to be described, Section 33-A, on Route 25 from Deans to Cranbury, N. J., included four bridges and the widening of one bridge. About 50 per cent of the highway is on new location, eliminating a winding roadway with short sight distances. There is also much new right-of-way on the old location because the old highway had a 20-foot paved width and the new dual highway has two 10-foot lanes in each direction, with three at some intersections. The raised medial strip or island has a width of 30 feet where the highway is on new location and 20 feet throughout the remainder of the job, with a 10-foot gravel shoulder on the outside and a 5-foot bituminous-macadam or gravel shoulder against the island. At bridges the island is reduced to 4 feet and is edged with 12-inch precast curb.

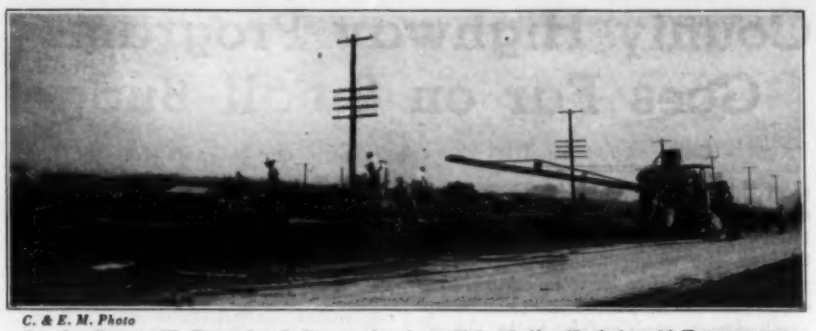
Preparation of Grade

The entire roadway is underlaid by an 8-inch sub-base layer of gravel excavated in the vicinity and spread by a Caterpillar No. 12 power grader and compacted by two 10-ton Huber rollers. This sub-base material contained sand, gravel and about 4 per cent of clay which was just sufficient enough to permit thorough compaction with 10-ton rollers.

The contractor started this job with 13,000 feet of new Blaw-Knox 10-inch steel road forms, sufficient to have always at least one mile of double forms ahead of the paver. This was one of those happy events which is the dream of a grade man as well as of a concrete inspector. The forms were set by two head form setters and two helpers. Immediately afterwards a Surgrader was run over the forms, removing any excess material and delivering it outside the forms. Behind this, the grade was rolled with a 5-ton Austin Pup roller to give the final compaction to the surface. The fine grade crew consisted of three to five men who luted the surface and shoveled off any excess dirt shown by checking with a scratch board. The same crew used a water-weight roller between the expansion joints as the final grading operation.

Batching by Subcontract

The weighing of aggregates and bulk cement as well as unloading them from the railroad cars and hauling the weighed batches to the skip of the paver was done under a subcontract by George C. Cochrane, Inc., of Trenton, N.J. This was one of the first New Jersey state highway jobs on which bulk cement was used. The batching plant was set up on a railroad siding at about the center of the job, making the haul about 3 miles to either end of the project. The entire area used for the subcontractor's office and the two batching plants, which were about 350 feet apart, was surface-treated with an asphaltic oil and well bladed to form a smooth driveway and yard and to prevent dust.



C. & E. M. Photo

On the George M. Brewster & Son contract on N.J. 25, the Koehring 34-E paver ran below the new grade for considerable distances, making handling the boom and bucket no easy task.

The two sizes of gravel and sand were unloaded from gondola cars and delivered to the three bins at the top of the Butler weighing batcher by two Lorain 55 cranes with 40-foot booms and a 1¼-yard clamshell bucket. A fleet of seven to ten batch trucks hauling two or three batches per truck, with separate cement boxes to prevent the cement being wet by moisture from the aggregate, fulfilled the requirements of the Koehring 34-E paver. The stockpiles were well bulkheaded on either side of the Butler batching plant under which the

(*Continued on page* 46)

PILE HAMMERS and EXTRACTORS

HOISTS—DERRICKS WHIRLERS

●

Special Equipment
Movable Bridge Machinery

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Write for descriptive catalogs.

McKIERNAN-TERRY CORP.
19 Park Row, New York

Distributors in Principal Cities

1924 Preparedness Day Parade. Universal Truck Cranes used in Lorain Tornado disaster by 112th Engineers, Ohio National Guard.

It Started with the A.E.F. in 1917

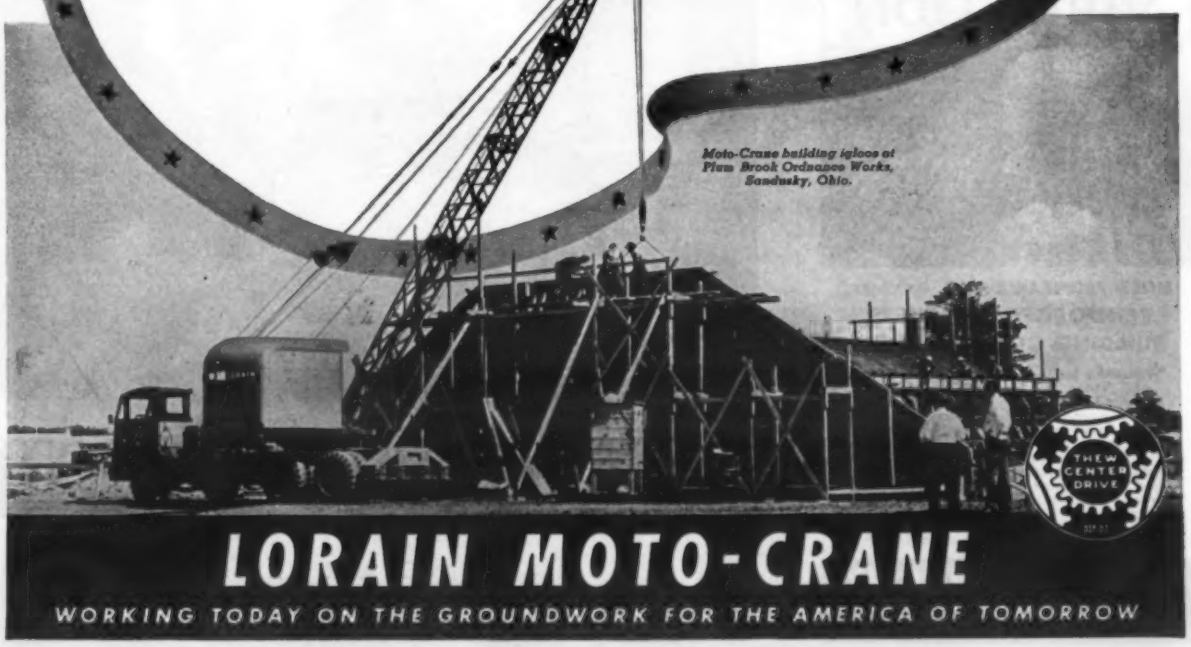
The idea for a motor truck crane was born with the American Expeditionary Force somewhere in France during World War I. It was transmitted back home in the form of a requisition. Though no such units were then manufactured, Thew-Lorain undertook their design and development. In 1918, Universal (Thew-Lorain subsidiary) produced the first full-revolving truck crane.

From that date on, Thew-Lorain engineers have never ceased their search for ways of increasing the effectiveness of portable rubber-tired cranes. Down through the peacetime years, capacities have gone up, new designs have been developed, new uses and higher standards of performance have been developed—others followed, but Thew-Lorain remained always in the lead.

Then, in 1939, Thew-Lorain broke with tradition and introduced the Moto-Crane. Here, for the first time, was a completely mechanized crane and shovel mounted on a specially designed 10 rubber-tired Crane Carrier—originated by Thew-Lorain, designed and built completely by Thew-Lorain—which set a new high standard both for mobility and on-the-job performance.

Thew-Lorain's years of accumulated specialized experience alone have made possible the development of the modern mechanized Moto-Crane which today is "in service" instead of "on requisition" in furthering America's Defense from Trinidad to Alaska, from Hawaii to Newfoundland.

UNIVERSAL CRANE DIVISION
THE THEW SHOVEL COMPANY
LORAIN, OHIO



Moto-Crane building igloos at Plum Brook Ordnance Works, Sandusky, Ohio.

LORAIN MOTO-CRANE

WORKING TODAY ON THE GROUNDWORK FOR THE AMERICA OF TOMORROW

County Highway Program Goes Far on Small Budget

(*Continued from page* 1)

the road may be included. The preference of Charles A. Speathe, County Highway Engineer, is to let the road go through one winter without its regular gravel surface in order to be certain that the grade has compacted and to show up any bad spots, such as frost boils. Then, when these are corrected in the spring is the right time for the complete surfacing of the road with gravel or crushed stone.

The Limited Budget

Remembering that Jones County has an assessed valuation of only $25,000,000, it may surprise some of our readers to learn that on one road 3 miles long in the extreme northeast corner of the county a total of $59,567 was expended in 1940 and 1941 to bring the road up to standard. This included 1940 expenditures of $21,894 for grading, $14,047 for temporary bridges, $18,000 for a 210-foot continuous I-beam bridge, paid out of the 1939 farm-to-market fund, and in 1941 $5,626 was expended for a gravel surfacing for this short section of road.

Funds for county highway construction are secured from a direct tax in all townships but excluding the cities. In 1941 this tax was 0.625 mill producing an anticipated $12,608.42. In addition, there was a tax of 0.5 mill on everything in the county which brought $12,071.61, also for construction. The anticipated gas receipts which are distributed prorata among the counties in accordance with the ratio of their area to the total area of the state amounted to $57,000.

On the maintenance side, the county built up its fund by a direct tax of 1.25 mills on all real estate, producing $30,179. In addition there was a tax of 3.00 mills in the townships outside of the cities, which produced $60,520, and the motor carrier tax which is apportioned by the state to the counties. This brought only $1,000 to Jones County. Then, in addition, the county has an optional fund for the highway department which may be used either for construction or maintenance. This was secured by a tax of 0.625 mill on all property in the county and produced $15,089.

The money received from the state's distribution of farm-to-market funds in Jones County has been used by leaving it with the State Highway Department so that the state may expend it with Federal-Aid secondary-road funds. The county thereby secures the benefit of additional funds without more expenditure or taxing by the county.

Careful Accounting

No matter whether a county has a $1,000,000 to spend on its highways or $100,000, it pays to keep a careful check on the little things, such as a gallon of gasoline delivered to a piece of equipment, or parts delivered over the counter at the garage for the repair of a piece of equipment.

In Jones County every machine is numbered and is assigned a driver who not only drives that machine all of the time, with exceptions of vacations and illness, but is responsible for the machine. He keeps a daily time sheet for the machine and for himself on which is indicated the project on which he is working as well as the gasoline and oil delivered to the machine that day. From these records the County Engineer keeps a summary of the average cost of operation of each piece of equipment, exclusive of operator's time, which shows the relative efficiency of different makes of equipment and of gas and diesel-powered equipment. These rates usually are higher the first year, because the county makes a practice of buying its equipment without a winter cab and manufacturing the cab in the shop, which naturally jumps the cost of that machine for the first year.

Repair and Storage Garages

The county maintains but one garage for the repair of equipment and every piece of equipment goes into this garage once each year for a complete overhaul. Crawlers on tractors are periodically overhauled in the field by hiring a special pneumatic pin press for the quick removal and installation of the crawler track pins. Another feature of the servicing of equipment is that one man is the sole "keeper of the keys" to the fuel tanks and he, with a 1½-ton truck equipped with a tank, delivers fuel to all equipment in the field and fills the small 150-gallon storage tanks and the small oil drums at the storage sheds scattered over the county.

There are ten of these storage sheds in the maintenance territories, in each of which is a light or heavy power grader or a tractor and a pull-type grader. Also in each supervisor's district there is a small tractor and fresno used for cleaning ditches and backfilling around culverts after installation. There are five of these outfits and also one large power grader in each district. These districts are not election districts but are merely laid out for the convenience of the five Supervisors. A heavy

(*Continued on next page*)

DEFENSE DRIVE
bans unnecessary shut-downs. Proper lubrication prevents forced lay-offs. For CONSTRUCTION EQUIPMENT there are . . .
. . . SINCLAIR SPECIALIZED OILS and GREASES
to meet and handle the grueling demands on heavily loaded machinery. Try these lubricants for top yield of continuous service hours. Full details, or lubrication counsel, promptly obtained by writing nearest Sinclair office or Sinclair Refining Company, 630 Fifth Ave., New York, N. Y.
Write for "The Service Factor"—a free publication devoted to the solution of lubricating problems.

EQUIPMENT of R. B. Potashnick, Cape Girardeau, Mo., working on highway project near Cache, Ill. Sinclair lubricants and fuel used.

SINCLAIR LUBRICANTS-FUELS

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REINFORCED CONCRETE BUILDING CONSTRUCTION

When the job calls for mass vibration—the Viber Vibrator at work above is your best bet. Especially made for walls over 10 inches thick, foundations, large girders thick floor slabs, columns . . . large reinforced concrete bridges, grade separations, concrete floor systems, concrete arches and rigid frame structures . . . In a word, for all concrete with large aggregate and low water-cement ratio.

Write for complete VIBER data TODAY!

VIBER COMPANY
726 SO. FLOWER STREET
BURBANK, CALIFORNIA

Repair Garage Has Convenient Devices

(*Continued from preceding page*)

patrol usually works on about 70 miles of road and one of the lighter outfits has about 50 miles for maintenance.

The Anamosa equipment maintenance shop for Jones County is a 50 x 38-foot wooden building with a concrete floor and is filled with conveniences which are the product of the ingenuity of the mechanic. One of these units was being loaded onto the fuel truck at the time of our visit and consisted of a small gasoline engine, of the type used for running a washing machine where electricity is not available, converted into a compressor and driven by a gas engine to furnish air for pumping up truck and other equipment tires in the field. This was entirely separate from the garage compressor and was a very handy unit for field work.

The repair shop in the garage measures 25 x 38 feet and has a swinging crane made of a heavy I-beam swiveled at the two ends and on which is mounted a horizontal boom at the top with a 1½-ton Wright chain hoist running on a trolley made from old crawler tractor rollers. This is a very convenient piece of equipment as it can move an engine or other heavy parts completely around the shop, except for about 45 degrees behind the pillar to which the rotating I-beam is affixed. In the repair shop also are an Adams electric welder, a Manley mechanical press, several neat tool boards, a corner bench with a sheet metal cover, a drill press, a power hack saw, a welding stand with a pipe rack swiveled to the side and made so that the entire stand can be revolved, and completely covered with fire clay brick. On the bench is a Black & Decker bench grinder and buffer, a Mall electric drill rigged as a small drill press, and over the bench a compressed-air outlet on a long boom so that it can be swung with a minimum of effort to any part of the bench for quick use. A 60-inch lathe purchased from a local machine shop has more than earned its keep.

All of the power equipment is driven by an electric motor, mounted above the door to the mechanic's office, through a jack shaft. Inasmuch as it would be expensive to put push buttons all over the repair shop for starting the motor and it would require many steps to start and stop the motor every time a piece of power equipment was used or was to be shut off, the mechanic has rigged an ingenious starting and stopping device, consisting of a long ½-inch-square wood rod which runs the full length of the bench at the back of the shop, and is within easy reach of every piece of power equipment. A pull on the rod starts the motor and a push stops it.

At the back of the shop is a Smith Welding Equipment Corp. acetylene generator, a blacksmith forge and anvil, a floor stand grinder and buffer and on the wall an Ingersoll-Rand garage compressor. Also on the wall is a small oil pump taken from a discarded piece of hydraulically operated equipment and driven with a very small electric motor.

C. & E. M. Photo
The front of the Jones County equipment maintenance shop, with the Adams electric welder ready to go out on an emergency repair job in the field.

This pump is used to move lubricating oils from the drums on the floor to dispensing drums overhead, so that when oil is needed it can be quickly drawn off by gravity.

The mechanic's office at the right near the back of the shop has a large file in which is a complete set of parts books for all of the equipment owned by the County Highway Department. A door leading off the mechanic's office goes to the parts and storage room where there are large bins for the storing of large repair parts for equipment and smaller bins on the opposite wall for hardware. A narrow section behind the mechanic's office is used for storing cans of anti-freeze, a few kegs of nails for immediate use, and on the walls are gaskets and fan belts.

In the second half of the garage is room for the storage of two trucks or graders and there also the ample supply of blacksmith steel is stored in racks against the back of the garage space. Behind the repair garage is another shed used for the storage of oil, grease, and tires which have been sent to the factory for retread. Here also was an ample stock of grader blades.

The county maintains only a one-half year's supply of oil as it has not room to stock any larger quantity. The contract is awarded for an entire year but is delivered at 6-month intervals. The same applies to the delivery of grease. A platform is built for storing the oil drums at the same elevation as the bed

(*Concluded on page* 30)

PMCO

WELDED DIPPERS

—make good shovels better

BETTER for digging heavy material, because the weight saved in the dipper allows heavy material to be handled without reducing dipper size.

BETTER for long reach shovels with extra long booms, because weight saved in the dipper allows a full size dipper capacity without increasing power or stress on the shovel structure.

BETTER capacity on regular shovels, because the weight saved in the dipper allows a larger dipper to be used and increases the pay load in some cases as much as 30%.

BETTER for structural strength in the dipper itself. Reinforced sections can be made extra strong to resist torsion in handling rock or lump material.

BETTER for special designed dippers, because the pattern cost is much less than with the solid cast type dipper.

These proven advantages are some of the reasons why today so many shovel engineers are using PMCO WELDED DIPPERS to MAKE GOOD SHOVELS BETTER.

We operate the largest and most complete manganese steel foundry in the United States

PETTIBONE MULLIKEN CORPORATION
4710 West Division Street, Chicago, Illinois

WET *Jobs?*
Dry Subgrades Guaranteed with
GRIFFIN WELLPOINT SYSTEMS
Whether you Buy or Rent!
BOTH Equipment and Dry Jobs are Guaranteed—
Let us prove that GRIFFIN EQUIPMENT IS BETTER!
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881 EAST 141st ST. NEW YORK, N. Y.
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A B-E 22-B crane on a special pneumatic-tired crane carriage made by Six Wheels, Inc.

Wheel-Mounted Crane, Special Gear Drive

To provide a heavy-duty crane of unusual mobility with one-man operation, a Bucyrus-Erie 22-B crane has been mounted on four dual pneumatic tires, and is propelled through the crane carriage and king pin by the crane motor. The drive is the standard bevel and mitre gear drive of Six Wheels, Inc., 1572 East 20th St., Los Angeles, Calif., and is applicable to any standard 7½ to 15-ton crane. The unit is completely one-man operated, equipped with air brakes, hydraulic steer, and hydraulically-controlled caster-type outriggers. Cranes thus equipped move three to four times faster than the conventional crawler-type units, it is stated.

Complete information on this and other types of wheel mountings for heavy trucks, cranes and shovels may be secured direct from the manufacturer by mentioning this item.

Mack Plans Increase In Truck Production

In order to meet not only the demands of urgent military defense orders but in addition to take care of its regular business for commercial requirements, Mack Trucks, Inc., 34th St. & 48th Ave., Long Island City, N. Y., has taken the necessary steps to expand facilities and speed up its output of both light and heavy-duty trucks. The general priority rating of A-3 granted to the truck industry is evidence of the vital importance placed by the Government on the uninterrupted production of transport vehicles.

In addition to the types required for military use, more than fifty standardized commercial models will be produced by Mack during 1942, ranging in size from 1 to 45 tons, in conventional or cab-over-engine types, gasoline or diesel-powered.

Because of the role being played by Mack's Super-Duty models in National Defense, particular attention is being given to this line of Super-Macks which are used for off-the-road operations such as in quarries, for heavy-duty hauling of ore, rock, earth, etc., in defense construction, and other large excavating jobs where huge yardages must be moved.

No important change in major units or in the general appearance of the present line is contemplated for the time being, although modifications will take place in the bright-work in accordance with the industry's program to reduce the non-essential consumption of nickel and chrome.

BARTLETT TREE TRIMMERS

Powerful compound lever cutting head has capacity of 1¼ in.

One-piece poles to 16 ft. or sectional poles as required.

Send for catalog No. 27

Orders must bear priority property certified.

BARTLETT MFG. CO.

3033 E. Grand Blvd. DETROIT, MICH.

New Line of Paints To Protect Metals

A new line of five paints, designed to provide civilian markets with products to replace now unavailable aluminum paints, has been announced by the American-Marietta Co., 43 East Ohio St., Chicago, Ill. Introduced as members of the company's "Defense Line" and tailored for both new construction and maintenance applications, these new paints may be applied by brushing or spraying.

Two Valdura Defense Grays, available in light and neutral shades, are designed to provide low-cost effective protection and long durability on exposed metal surfaces. Permanent elasticity is provided in the paint film, the producer states, to assure years of rugged service on structural steel bridges, guard rail and fences, tanks and similar uses where there is appreciable expansion and contraction due to temperature changes. Both colors have high gloss finishes and are highly resistant to rain, sun, grime, smoke and rust. The coverage of these paints is 450 square feet per gallon.

Valdura enamelized yellow metal primer, with a coverage of 500 square feet to the gallon, is for all types of metal surfaces, particularly where the metal is subjected to extremely damp, wet and foggy conditions. It may be used under water when covered with one or two coats of Defense Grays. Its light yellow color permits the use of a single coat to hide the primed surface.

Valdura metal lead paint provides a protective lead-colored metal coating for all metal surfaces, including new or old galvanized metal. It is stated that metallic lead provides a leafing action similar to that of aluminum, affording a coating resistant to acids and alkalies, and to fumes, rust and moisture. Its rated coverage is about 600 square feet of clean metal per gallon.

Valdura tank white has been introduced to replace aluminum paint in applications where it is desirable to cut evaporation losses and reduce inside temperatures. Its coverage is about 450 square feet to the gallon with brush or spray.

Further details on this new Defense Line of paints and their many applications may be secured by interested contractors and engineers direct from the producer by mentioning this item.

C-P Personnel Changes

The Chicago Pneumatic Tool Co., 6 East 44th St., New York City, announced recently the promotion of Joseph A. Sullivan, Assistant Publicity Manager, to Advertising Manager. Mr. Sullivan joined the Chicago Pneumatic organization in 1928 as head of the direct-mail division of the Publicity Department.

J. E. O'Rourke, a sales engineer well known among large contractors, has joined the Contractors' Division of this company, and E. R. Goss has been appointed Branch Manager of the El Paso, Texas, Office, succeeding E. J. Coughlin who was killed in an automobile accident.

America Looks to SMITH for Better Concrete Mixers!

BIG Concrete Jobs are Poured by SMITH

From coast to coast, and in many foreign countries, Smith Mixers have been an important factor in building the world's greatest concrete structures. The map above shows only a few of the more outstanding U. S. projects. Hundreds more could be listed.

Pre-Mix Plants

Certified Concrete, Ltd., New Zealand, one of numerous Pre-Mix Plants employing Smith Tilting Mixers and Smith-Mobile Agitators — the winning combination for mixing and delivering uniform concrete.

The T. L. Smith Company's acknowledged leadership in the industry is the result of 42 years' specialized experience in building concrete mixers of all types and sizes. It is natural, therefore, that contractors and engineers should look to Smith for important developments in mixer design.

Only two years ago, Smith announced a new tilting mixer with many advanced features. Now Smith proudly presents an even newer model with more important improvements such as: **All-welded box girder pedestals and tilting frame . . . Heat-treated, high carbon steel roller track, drum gear and pinion with machine cut teeth . . . Forged, heat-treated edge rollers and main rollers . . . Faster and steeper tilt with choice of modern hydraulic or pneumatic tilting unit . . . Fully enclosed, machine cut spur gear transmission unit with splined alloy steel shafts . . . Direct-connected motor drive . . . Etc.**

Naturally, all new model Smith Tilters retain the famous Smith duo-cone drum with its fast discharge and "End-to-Center" mixing action. The last word in concrete mixer design and construction.

Smith Tilters are available in all sizes up to and including 4 yards per batch. Write today for further information.

THE T. L. SMITH COMPANY

2857 North 32nd Street • Milwaukee, Wis., U. S. A.

SMITH

CONCRETE MIXER MANUFACTURERS SINCE 1900

A 3615-1P

Pouring Core Trench At Youghiogheny Dam

Square Trench Drilled, Excavated and Concreted For Full Length of Dam South of Confluence, Pa.

✦ WORK on the core trench for Youghiogheny Dam, which will impound the flood waters of the river of the same name in southwestern Pennsylvania, is nearing completion by the associated contractors, Hunkin & Conkey Construction Co. of Cleveland, Ohio, and Schofner, Gordon & Hinman of Los Angeles, Calif., preparatory to starting the construction of the earth dam. The contract requires the excavation of the core trench, the construction of the grout cap, the grouting of the rock foundation and placing the core-trench fill in the stream bed and on the abutment slopes up to Elev. 1,365 before April 1, 1942, when the stream is to be diverted through the outlet tunnel completed by Herman Holmes of Crystal Falls, Michigan.

Stripping the Site

The contractors started work immediately after the award of the contract on June 13, 1941, by stripping the core-trench area as well as the entire dam site and spillway areas. They used five 13-yard LeTourneau Carryall scrapers and two 28-yard Carryalls, all pulled by Caterpillar D8 tractors, of which there was a total of eleven on the job, some with bulldozers and some used as pushers during loading of the scrapers.

As work is carried on 24 hours a day, the contractors have the areas of operation well illuminated with Westinghouse 750-watt floodlights equipped with Alzak reflectors, either singly or in groups. Power for the floodlights as well as for the electric-driven pumps is taken from the West Penn high line.

Drilling and Excavation

The 3 x 3-foot core trench is line-drilled with Ingersoll-Rand Jackhamers equipped with I-R Jackbits and then broken out with I-R pavement breakers, as the material is a shale readily handled in this manner. The specifications forbid the use of explosives as this would shatter the shale too far back from the trench and require excessive grouting to stabilize the rock.

During the excavation of the trench by a 2-yard Koehring 801 shovel and also just prior to concreting, the water seeping into the trench is removed by two Gorman-Rupp self-priming centrifugal pumps driven by Master 5-hp motors. Another Gorman-Rupp self-priming pump driven by a Wisconsin motor, mounted on the river bank, is used to provide water for the concrete mixer and, when required, is reversed and used for pumping water from the trench.

Cleaning and Concreting

Prior to placing the concrete in the core trench, it is thoroughly cleaned by hand sweeping to remove chips and water and then the entire surface area blown with compressed air, using a ¾-inch pipe. This results in an unusually clean rock trench.

C. & E. M. Photo

Paving the core trench at Youghiogheny Dam, Confluence, Penna.

The concrete aggregate is batched at the Herman Holmes batching plant which was set up at the time to furnish

(*Concluded on page* 45)

RED DEVIL
LIGHT
and POWER PLANTS
800 to 50,000 WATTS

3,000 WATT
as illustrated on Pneumatic Tires
$445.00

Finish the job quicker and save money with electricity.

Send for catalog describing generators and our complete line of portable poles for floodlighting.

E. B. KELLEY CO., Inc.
43-47 Vernon Blvd.
Long Island City, N. Y.

● We hope you have never had a lost-time accident due to wire rope. Some operators have—and *this* is no time to have workmen laid up with a blood-poisoned hand. Some operators have drastically reduced compensation claims by adopting American Cable **TRU-LAY PREFORMED**—the *safer* rope. . . . Being preformed, American Cable **TRU-LAY** is tractable—flexible—easy to handle. It resists kinking and snarling. Worn or broken crown wires lie flat and in place—refusing to wicker out to puncture hands or tear clothing. . . . Furthermore, being preformed **TRU-LAY** will last longer than ordinary cable. It has far greater resistance to bending fatigue. That means reduced machine shutdowns for replacement—steadier production—greater dollar value. . . . All American Cable ropes identified by the Emerald strand are made of Improved Plow Steel.

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ESSENTIAL PRODUCTS . . . AMERICAN CABLE Wire Rope, TRU-STOP Emergency Brakes, TRU-LAY Control Cables, AMERICAN Chain, WEED Tire Chains, ACCO Malleable Iron Castings, CAMPBELL Cutting Machines, FORD Hoists and Trolleys, HAZARD Wire Rope, Yacht Rigging, Aircraft Control Cables, MANLEY Auto Service Equipment, OWEN Springs, PAGE Fence, Shaped Wire, Welding Wire, READING-PRATT & CADY Valves, READING Electric Steel Castings, WRIGHT Hoists, Cranes, Presses . . . *In Business for Your Safety*

The Whiteman Precision concrete-floor finishing machine.

Easy Fine Control For Floor Finisher

The concrete floors of Army and Navy hangars must be finished to micrometric fineness, smoothness and grade to insure that liquids will drain away immediately to prevent slippery sections for the airplane or workers, and to prevent deterioration of the floor. The Precision concrete-floor finishing machine, developed by Whiteman Mfg. Co., 3249 Casitas Ave., Los Angeles, Calif., has already demonstrated its ability in finishing floors in buildings, and has been applied on many Federal jobs in the National Rearmament Program, including hangar floors. The manufacturer calls attention to the fact that this machine gives a uniform distribution of the coarse aggregates throughout the entire depth of the slab, right up to the wearing surface, and does away with laitance and weak mortar at the surface. In this manner, wear-resistant floors are produced which eliminate mounting maintenance costs and trouble.

The Whiteman machine does away with the back-breaking, knee-blistering methods of slow, laborious hand-troweling by the concrete finisher. The machine is simple in operation, as a slight turn of the wheel on the operator's end of the handle gives instant tilt to the rotating trowels, setting them to a very fine adjustment of pitch, while the machine is in motion. This gives the operator a controllable touch while the finisher is gliding over the surface. A slight downward pressure on the operator's handle causes the finisher to move to the right, while a slight upward pull moves the machine to the left. The electrical model starts or stops by means of a finger switch, while the gasoline engine is immediately controlled through the use of a Mercury automatic clutch.

Complete information on this unit will be furnished direct by the manufacturer to those mentioning this item.

Construction Industry Joins in Defense Show

Because of the great role being played by the construction industry in the National Defense Program, the Kansas City Chapter of the Associated General Contractors of America and the Builders' Association of Kansas City joined in a double-booth display of outstanding interest and attractiveness at the Midwest Defense and Industrial Exposition held at the Municipal Auditorium in Kansas City, Mo., in November.

These two organizations went to considerable expense and trouble to secure a 20-foot long mural painted especially for the occasion. The mural depicts Kansas City, "Built for Defense," with the caption above "Builders of a Nation: —For Peace—For Defense". The wings on either side of the mural portrayed the seal of the respective organizations and gave a few pertinent facts relative to the construction industry.

A special attraction at the booth was "Miss Victory" atop a Victory Tower which was highly spot-lighted and could be seen from any point in the Exposition Hall.

This was one of the first attempts by the Kansas City Chapter to attract public attention by "unusual" means, and they feel that their efforts on this occasion were very successful.

Bulletin on Finegraders

A new illustrated bulletin describing Buckeye R-B Power Finegraders for road and airport-runway construction has recently been issued by the Buckeye Traction Ditcher Co., Findlay, Ohio. New design features are discussed, including the new tandem form wheels, hydraulic lifts and heavier frames, and specifications are given on Model RB24F, adjustable from 20 to 25-foot widths, and Model RB13F, adjustable from 10 to 13-foot widths. According to the manufacturer, the R-B Finegrader cuts grade to specifications in one pass, eliminates high spots and voids, and has sufficient speed to prepare grade well ahead of the fastest pavers.

Copies of this new bulletin may be obtained by writing direct to Buckeye and mentioning this item.

Contractors Need Transport Mixers!

Open top provides visible mixing with ease of loading.

•

Side and rear discharge for widening, patching, paving, and bridge and culvert construction.

•

Inexpensive to own and operate.

CONCRETE TRANSPORT MIXER CO., INC.
600 ROSEDALE AVE., ST. LOUIS, MO.

OSGOOD

OSGOOD Model 800 Air Control shovel owned by The Metropolitan Paving Brick Company, Inc., Canton, Ohio, handling some mighty tough digging at their Mapleton plant.

OSGOOD AIR CONTROL

The smooth, velvety, effortless control force that makes a big power shovel perform in tough cemented shale as if it were an old time steamer. OSGOOD Air Control is simple in operation, easy to maintain, and costs next to nothing. Sooner or later, you will surely want to know all about OSGOOD Air Control. Why not investigate now?

The GENERAL EXCAVATOR CO.
Sizes: ⅜-½-⅝-¾
DIESEL - GAS - ELECTRIC
Associated with THE OSGOOD CO.

The HERCULES COMPANY
HERCULES "IRONEROLLERS"
6 to 12 Tons
Diesel or Gasoline
Associated with THE OSGOOD CO.

OSGOOD
Sizes: ½ to 2½ Cu. Yd.
Diesel - Oil - Gas - Electric
SHOVELS
DRAGLINES - CRANES
Crawler & Wheel Mounted
THE OSGOOD COMPANY, Marion, Ohio

COMPLETE
WELL POINT SYSTEMS
WILL DRY UP ANY EXCAVATION
Faster—More Economically
Write for Job Estimate and Literature
COMPLETE
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36-40 11th St., Long Island City, N.Y.
Tel. IRonsides 6-8600

A.I.S.C. Announces Jury For Student Competition

The following jury has been announced by the American Institute of Steel Construction to select the prize-winning designs in the Students' Annual Bridge Design Competition: Lorimer Rich and Don E. Hatch, Architects; Henry C. Tammen of Howard, Needles, Tammen & Bergendoff, Consulting Engineers; Roger W. Sherman, Managing Editor, *Architectural Record*, all of New York City; and L. G. Sumner, Engineer of Bridges and Structures, Connecticut State Highway Department, Hartford, Conn.

This competition has been held annually during the past 13 years and awards of $200, $100 and $50 are made. The jury will meet at the headquarters of the Institute, 101 Park Ave., New York City, on February 18, 1942, to make their selections.

Catalog on Impact Breaker

The Cedarapids Kubit impact breaker is the subject of a new bulletin, K-2, recently published by the Iowa Manufacturing Co., Cedar Rapids, Iowa. Printed in two colors, this bulletin discusses the Kubit machine, the quality of the finished product, and tests of the product. Construction features are well illustrated and operating advantages are defined, and there is information on its wide range of applications in portable and stationary plants.

The manufacturer states that one of its services is a test house where customers' samples are run through a Kubit breaker. After the samples are run, part of the finished product is screened and a complete analysis is made on the percentage of each size. Pictures of this test laboratory are shown in the bulletin, copies of which may be obtained by writing direct to the manufacturer and mentioning CONTRACTORS AND ENGINEERS MONTHLY.

Material-Handling Units Discussed in Periodical

The Stephens-Adamson Mfg. Co., Aurora, Illinois, issues periodically a magazine entitled the "Labor Saver" devoted to bringing its readers the latest available information on new material-handling designs, and problems which Stephens-Adamson helped to solve. The latest issue, Volume 188, contains many illustrations and covers a wide range of material-handling problems.

Those interested may be added to the list to receive copies of this magazine regularly by writing direct to the manufacturer and mentioning this item.

More Speed FOR THE DEFENSE JOBS!

Here's the "Caterpillar" Diesel DW-10 Wheel Tractor pulling the "Caterpillar"-built W-10 Wagon, with capacity of 11 cu. yds., heaped measure.

"TIME IS SHORT." So reads the sober reminder posted in a thousand busy defense plants from coast to coast. Engineers and contractors on defense work don't need to be told. They've been giving time a licking ever since America began to prepare.

Now they've got a new ally in their battle. Already the "Caterpillar" Diesel DW-10 Tractor is speeding up defense on a growing list of jobs.

Designed and built from the ground up for long, fast, heavy hauling, this unit is doing all that was expected of it, and more! It has the husky, economical power of a 98-hp. "Caterpillar" Diesel Engine. "Finger-tip" steering. "High-traction" differential. Short turning radius. Full floating seat. Heavy-duty constant mesh transmission. Five speeds forward. High clearance. Scientific weight distribution that gives super-traction for every use.

The "Caterpillar" Diesel DW-10 Tractor is amply powered to handle a big payload at 18 miles an hour. And it has all the advantages of simple, rugged, dependable "Caterpillar" construction, through and through.

CATERPILLAR TRACTOR CO., PEORIA, ILLINOIS

★ ★ ★ **FOR VICTORY** — *Our armed forces have first call on "Caterpillar" production. We thank our customers who have suffered delivery delays by giving clear right-of-way to our Victory efforts.*

Some of the defense jobs where "Caterpillar" Diesel DW-10 Tractors are setting records for speed and economy:

Fort Worth Bomber Plant	4 units
Twin City Ordnance Plant	10 units
Mississippi Ordnance Plant	10 units
Lauderdale Airport, Mississippi	4 units
Bermuda Base Construction	16 units
Merced Airport, California	3 units
Denver-Cheyenne Defense Highway	3 units
Des Moines Arms Plant	8 units

This "Caterpillar" Diesel DW-10 Tractor is pulling a LeTourneau Carryall scraper on a leveling job.

The new "Caterpillar" Diesel DW-10 Tractor with LaPlant-Choate scraper moving earth on an airport.

CATERPILLAR
REG. U.S. PAT. OFF.
Diesel

ENGINES AND ELECTRIC SETS
TRACK-TYPE TRACTORS
WHEEL TRACTORS · ROAD MACHINERY

The Mall chain saw.

Chain Saw Cuts Logs Or Timbers Quickly

The portable gasoline-driven chain saw manufactured by the Mall Tool Co., 7740 So. Chicago Ave., Chicago, Ill., is designed to cut a tree or pile and leave 3 or fewer inches of stump. It can be swiveled to cut in any direction, and quickly cuts through timbers or logs, the manufacturer states.

Each saw is equipped with a chain saw sharpening device which can be used at the job site. The saws are available in 24, 36 and 48-inch lengths and in models powered by compressed air, electricity or gasoline. The air-driven unit can be used under water.

A folder giving complete information on this Mall chain saw may be secured direct from the manufacturer by mentioning this item.

Liquid-Resin Effect On Blown Asphalts

The effects of two liquid resins on the properties of blown asphalt have been the subject of study by the Synthetics Department of Hercules Powder Co., Wilmington, Dela., for a considerable period of time. These two materials, Abalyn and Hercolyn, are liquid resins with the same high boiling point, 360-370 degrees Centigrade, the same heat-stability and the same low vapor pressure. However, Hercolyn is hydrogenated to the point where it is essentially stable to oxidation, while Abalyn will very slowly "dry" or oxidize on exposure to a brittle resinous material. The effects of the two resins on blown asphalt are almost identical but, since Hercolyn is far more resistant to oxidation and embrittlement, it is considered by its producers as having more opportunity for use in the asphalt industry.

The studies include the properties of both high and low-blown asphalt, unmodified and also blended with Hercolyn, with the blowing so varied as to make the resultant control and blends all have the same final melting point. These studies show that the addition of Hercolyn gives better flexibility and impact-resistance at low temperatures, slightly improved temperature susceptibility factors, no noticeable decrease in penetrometer hardness, sharply increased fluidity in the molten state, all at the same melting point as the control asphalt. The Synthetics Department, Hercules Powder Co., states that the results of the studies would indicate that a highly blown asphalt may be so treated with these liquid resins as to cause the resultant material to partake of some of the desirable characteristics of mineral pitches or Gilsonite, at considerable savings. Also, these preliminary studies have led to a program of work now going forward on the wetting of and adhesiveness to crushed stone, penetration of soils, etc., which are expected to be of great practical value to manufacturers and users of asphalt emulsions and cutbacks.

An 8-page booklet, "Some Effects of Abalyn and Hercolyn on the Properties of Blown Asphalt", may be secured direct from the Synthetics Department, Hercules Powder Co., Inc., Wilmington, Dela., by mentioning this item and publication.

Agricultural Plows On Stabilization Jobs

It is important that soil-stabilization mixtures be turned over completely at the edges, prior to mixing operations, by pulverizers or blades, to insure that the stabilizing agent will reach to the very bottom of the layer of soil. Wiard Plow Co., Batavia, N. Y., recommends its T. P. 132 and T. P. 232 tractor plows for this service, as they are designed for use with the new smaller-type farm tractors and are built exactly like the heavier 4X type plows. They have the same flexible hitch which admits of easy adjustment for use with any type of tractor.

The plows are equipped with adjustable extra-heavy springs, and a special lever is provided to allow the operator to re-hitch without leaving the tractor. All steels used throughout are of high grade, and the two plows weigh 550 pounds and 765 pounds respectively, cutting one or two furrows.

Complete information on these plows will be found in a 2-page bulletin which may be secured direct from the manufacturer by mentioning this item.

Secretary of Sauerman Dies

Gilbert Hambledon Tompkins, Secretary of Sauerman Bros., Inc., Chicago, Ill., died suddenly at his home on December 2, 1941. Mr. Tompkins had been with the Sauerman organization since 1909 and Secretary of the corporation since 1925. In his 32 years with this company he traveled extensively throughout the country and was well known in the material-producing and construction industries.

GATKE HI-POWER SWING FRICTIONS for TOUGH SERVICE

The new GATKE *HI-POWER* Frictions will save you plenty on TOUGH jobs.
They have power for swinging heavy loads—*guts* to *stand the heat and hold*—*long wear life* that you must experience to believe.
Whatever your service, we have what it takes to do the job and will guarantee results.
Just tell us what you need.

Gatke QUALITY

ASBESTOS PRODUCTS
FRICTIONS - BRAKE LININGS
CLUTCH FACINGS - FABRIC BEARINGS
GATKE CORPORATION 224 N. La Salle St. Chicago

"You put in steel, and hemp, and something called Experience . . ."

It's something only time and tasks can bring

"Make all the tests you want of wire rope samples. Pull them apart, into steel and hemp, and still you'll never find the quality that's paramount. The makers' experience . . . *knowing how.*

Our experience here at Roebling has two dimensions. You can count it on the map or on the calendar. You can see it working from the ingot to the finished reel.

When Doctor Beebe's Bathysphere sank down into the ocean's depths, a full half mile, his lifeline back to sunlight was a single length of Roebling "Blue Center" Wire Rope. When the builders of Mud Mountain Dam, Enumclaw, Washington, built a 35,000 pound tent that would cover half a city block, to protect their fill, Roebling Wire Rope was chosen to support its immensity, to hold against wind and rain.

Equipping the world's largest power shovel . . . building the Golden Gate and George Washington bridges . . . lifting lives from the world's deepest mine . . . Roebling is both the teacher and the pupil, whenever we tackle such a job. All across the country, on its lakes and oceans, Roebling's learning every day ways to make "Blue Center" better than before. Experience . . .

As Roebling field men learn from rope at work, new generations here at Trenton are learning secrets from the old. Father is teaching son how to tell when an ingot is ready to leave the soaking pit, to be kneaded into Roebling billets. Roebling engineers are learning more and more of wire rope's jobs, and how to meet them to a 'T'.

Roebling research is uncovering brand new facts that will make this trade mark mean even more to-morrow . . ."

JAR ROEBLING

Experience of men in the Roebling mills, of Roebling men in the field . . . Roebling process control, and engineering, and research . . . there's many a hidden ingredient in "Blue Center" Wire Rope. Reasons why it lives so long, and never fails to deliver its full measure of service.

JOHN A. ROEBLING'S SONS COMPANY
TRENTON, NEW JERSEY
Branches in Principal Cities

THAT'S THE ONLY WAY TO MAKE
ROEBLING
"Blue Center"
STEEL WIRE ROPE
PREFORMED OR NON-PREFORMED

Real Savings Made By Thin Resurfacing

Glynn County, Ga., Rebuilt 25 Miles of Old Surface-Treated Lime Rock, Using a 1-Inch Sand-Asphalt Mix

(*Photo on page* 48)

✦ A JUDICIOUS selection of available economical aggregates mixed with the proper proportions of asphalt to give a lean but strong mix, and a careful patching of weak spots in the old surface-treated lime rock base laid in 1927-28, produced 25 miles of practically new roads on St. Simons Island in Glynn County, Georgia. It would have cost at least $100,000 to have scarified the old base and placed a new surface treatment, whereas the cost of the 25 miles of retread involved an expenditure of less than $60,000.

The essential features of this type of retread are:

1. It uses 30 per cent of readily-available local fine sand in the mix.
2. The coarse sand furnishing the stability for the mix is lightered in from the Altamaha River at a reasonable cost.
3. The mix is put down lean to prevent undue bleeding of the rich repair areas below.
4. It is laid 1 inch thick to prevent frost breaking through to the base, which would happen in the colder Georgia winters if only a ½-inch thickness were used.
5. By using a lean mix, a flush coat or seal can be applied, using 0.12 gallon per square yard when needed, without the necessity of covering the surface with a sand blotter, as the RC2 asphalt will penetrate readily.

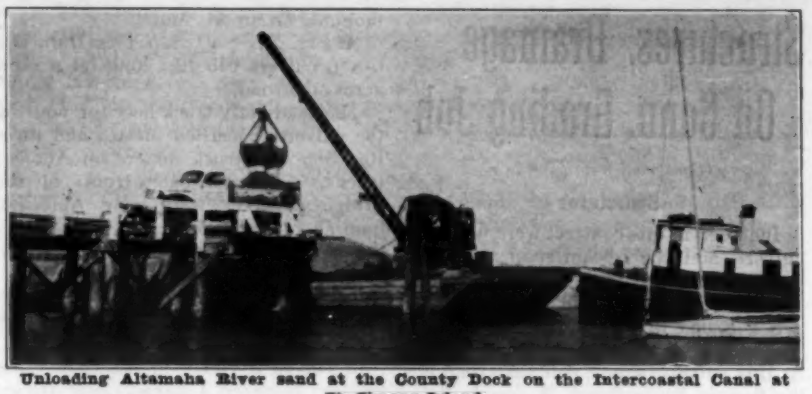
The Test of Materials

In the design of the mix used for the retread mentioned, careful tests in line with Florida Road Department practice were made of the bearing values of the coarse and fine sand in 6-inch-diameter molds, using 4 per cent moisture and applying a pressure of 1,200 pounds to compact the sand. Following this, a plug of 1-square-inch area, placed on the surface of the sand, was loaded in small increments. If the pressure built up to 30 pounds per square inch, the sand would be acceptable for low-cost bituminous construction for traffic of less than 1,600 vehicles per day. The local sand had a bearing value of 40, and the coarser sand a bearing value of 230.

The Mixing Plant

In order to obtain uniform mixes and an output in reasonable volume, the County secured the use of a portable Cedarapids mixer which was set up as a stationary plant at the Glynn County Airport, on St. Simons Island, employing hand labor entirely for proportioning and loading the material in order to use relief labor. The plant is set up on 12 x 12 timbers to give a foundation free of vibration and no settlement has occurred.

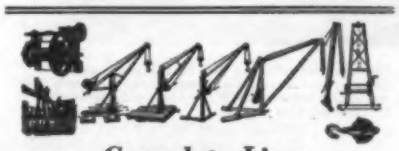
The local sand, excavated from a pit at the airport, is stockpiled at one side of the feeding platform, and the Altamaha River coarse sand stockpiled at the opposite side of the loading platform. At the center of the platform is a hopper and hand-operated gate through which the sand in 12-cubic foot batches are dumped into a 12-cubic foot skip running on a sloping track up to a point immediately over the pugmill mixer. A total of about 18 men are used to move the sand from the stockpiles in wheelbarrows to the loading hopper. The 12-cubic foot skip, which is metal-lined and has a sloping bottom so as to discharge quickly when the front gate is opened, is raised up the inclined track by four men working at two hand-cranks, who run the skip up and then are replaced by four other men for the next load so that the crews alternate.



Unloading Altamaha River sand at the County Dock on the Intercoastal Canal at St. Simons Island.

The asphalt for the plant is stored in the 800-gallon tank of a Littleford hauling tank which has been dismounted and set up adjacent to the plant. The pump of the Littleford tank delivers the RC3 to a 400-gallon integral mixer tank, from which 8.4 gallons of the asphalt is delivered by meter to each batch after the sand has been dumped into the pugmill, and the batch is then mixed for a total of 30 seconds and unloaded into a truck below for hauling direct to the road. The 1½-ton trucks haul six batches per load, or a total of 6,400 pounds of mixed sand-asphalt per trip. The pump on the Littleford storage tank is driven

(*Concluded on page* 36)



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HOW TO SOLVE REPLACEMENT PROBLEMS *Without* BUYING NEW PARTS!

With time at a premium and replacement parts becoming increasingly hard to get, the contractor must not only keep his equipment operating at top-notch efficiency, but he must also make each part last just as long as possible.

The majority of contractors are finding that the best way to attain these objectives is to protect the wearing surfaces of their equipment with Stoody Hard-Facing Alloys.

These metals, supplied in welding rods for oxy-acetylene, A.C. or D.C. electric application, form hard, wear-resistant deposits that reduce wear to a minimum and greatly prolong equipment life. A further advantage of hard-facing is that when the original deposit wears away the operation can be repeated three or four times. Thus, one part can be made to do the work of *ten* to *twenty* ordinary parts.

Here are typical examples where contractors are solving wear problems with STOODY Hard-Facing Alloys

Ditcher teeth became dull in three days—now last forty days.

A California contractor had seven ditcher machines, each equipped with sixty .70 carbon steel teeth. When the machines were in continuous operation, teeth would become so dull in three days they had to be taken off and sharpened—five sharpenings and the teeth were ready for the scrap pile.

This contractor now hard-faces the tips of his ditcher teeth with 30-40 Acetylene Tube Borium. Even in the toughest formations, teeth faced with this metal stay sharp forty days, and when the deposit wears away the application can be repeated three times before teeth are discarded. Thus, one set of teeth now lasts one hundred and twenty days as against fifteen to twenty days for ordinary teeth. One pound of Acetylene Tube Borium will tip sixty teeth. Welding time is approximately one minute per tooth.

Hard-Facing pump shells reduces sand production costs 5c per yard.

An Oklahoma contractor operating an eight-inch sand pump has reduced maintenance costs from 10c per yard to 5c per yard by rebuilding worn shells, impellers, and lining plates with Stoody Manganese and Coated Stoody Self-Hardening. According to the maintenance superintendent, a new pump costs $900.00, while complete cost of rebuilding is only $200.00, including time and material. Pumps rebuilt with Stoody metals last *longer* and are more *efficient* than new manganese pumps.

There is a Stoody Alloy for every type of abrasion problem. The Stoody representative near you will be glad to help you select the proper type of rod for your requirement and help you with the actual application.

STOODY COMPANY
1134 West Slauson Ave., Whittier, California

STOODY COMPANY *Hard Facing Alloys*

Structures, Drainage On Conn. Grading Job

(*Continued from page 2*)

Structures

Included in this contract were five box culverts and one I-beam span and concrete-deck bridge with a 36-foot span. The first reinforced-concrete culvert is a 5 x 5 box at Sta. 56+86 while the second is an 8 x 8 box at Sta. 121+10. At this culvert, which will take care of the flow in Lyon Brook, a double diaphragm Domestic pump was used to keep the water from the footing during construction.

At Sta. 194+1 a detour was put in around a 7 x 8 box culvert which was built with a joint so that traffic could be handled over one-half the road while the other half of the culvert was being poured. At this point a temporary 24-inch corrugated metal culvert was put in under a cattle crossing to take care of the water which would have flowed through the old culvert and the water was run through muck excavation where the new road would be located to the north of the old road. This water was finally taken care of by an existing culvert at Sta. 203. This 8 x 7 box culvert was put in on piles after the old bridge had been broken out by a 1½-ton skull cracker. The piles were driven by a 5-ton Vulcan steam hammer powered by the boiler from an old 450 Marion steam shovel.

The road crosses the old right-of-way twice around Sta. 260 where there is a channel diversion and a 10 x 6 box culvert, followed at Sta. 270 by the 36-foot span I-beam and concrete-deck bridge. At this location a 6-inch Gorman-Rupp and a 3-inch Jaeger Sure-Prime pump unwatered the foundation area while a Rex road pump furnished water for the 27-E Rex paver which mixed all the concrete for the bridge, as no transit-mixed concrete was permitted except for box culverts. A Northwest truck crane with a 50-foot boom was used to place the concrete by swinging a Blaw-Knox bottom-dump bucket from the paver to the forms. An Erie AggreMeter batching plant was set up near the east end of the job to batch material for both the paver and truck mixers. Adequate stone and sand was stockpiled for the concrete and rehandled by a Universal truck crane mounted on an AC Mack.

At Sta. 299+40, Sap Tree Run, is a 6 x 6 culvert 148 feet long on a skew across the road.

The ready-mix truck fleet for pouring the culverts consisted of two and three Rex 3½-yard truck mixers on Autocar trucks. All of the batch trucks for the bridge concrete were new Autocars, hauling four batches each. Only two of this new fleet, purchased by Gammino, were required for this structure.

The trap rock aggregate for the structures was unloaded at a coalman's pit at the Pomfret Station of the New York, New Haven & Hartford Railroad. This location required a minimum of rehandling and was only ½-mile from the batching plant located about 500 feet east of the end of the job.

Subdrainage

In accordance with the standard practice of Connecticut (See C. & E.M., October, 1940, page 17) a total of 17,890 feet of 6-inch underdrain comprised of Armco perforated corrugated asphalt-coated pipe with 37 clean-out inlets was installed on this job prior to paving. A ¾-yard Northwest trench hoe powered with a Waukesha gas engine was used for culvert excavation as well as for excavating all of the pipe trenches.

Muck Excavation

There were a considerable number of muck holes on this job, practically all of which were handled identically, as described below. The major muck hole on the job occurred at Sta. 56 and was 4 to 8 feet deep with a stream running through the center. The muck was excavated on either side of the stream by a 1¼-yard Northwest dragline with a 50-foot boom, which cast the muck to the side. This section was heavily timbered and the timber was used to corduroy the section on which the dragline was working and the smaller branches and twigs for making a mat. This was found much more expeditious and economical than using pontoons which proved to be much slower than using the natural timber on the site. The muck hole was filled by end dumping rock from adjacent cuts up to 2 feet below subgrade elevation. The box culvert through this section was carried on piles.

C. & E. M. Photo
"Mike" Gammino, President of the M. A. Gammino Construction Co. at the right, and J. F. Ableman, Superintendent on the Pomfret, Conn., grading job.

At Sta. 96 another muck hole was handled with the same Northwest dragline which had been equipped with a new Cummins diesel engine. At Sta. 186

(*Continued on next page*)

An Asphalt

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Stays pliable all winter—sets promptly on laying.

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It Won't Happen Here!

with Universals on the Job

In World War I the A.E.F. spent half its time digging itself out of chuck holes and wallows—hydroplanes could land on airports almost all the time. That was *over there!*

But it won't happen here, thanks to Universal Portable Crushing Plants which are turning out specification chips, aggregates and base course material for hundreds of airports, camps, naval bases, access roads and other defense projects.

Universals are patriotic because they turn out material faster, require fewer repairs, thereby saving strategic materials and they conserve fuel! You can do more for Uncle Sam and do better for yourself with a Universal. Everything for crushing, pulverizing, screening, loading, washing and storage.

UNIVERSAL CRUSHER CO.
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Cedar Rapids, Iowa

Triangle Construction Co., Boise, Idaho, chose a Universal Jaw Crusher for their composite plant (on right) to make material for Walla Walla, Wash. airport. Averages 2,000 tons a day.

Below: "Pacemaker" Quarry Plant with "Two-in-One" Rolls makes high yardages of defense material at low cost per yard for Halvorson Bros., Rochester, Minn.

Universals are putting a firm base under Canadian defense, too—a Junior Gravelmaster (above) crowds out airport material for W. B. Uren, Contractor of St. Georges, Ont.

UNIVERSAL
CRUSHERS, PULVERIZERS, COMPLETE PLANTS, SPREADEROLLERS, PORTABLE ASPHALT PLANTS

Muck Problem Licked; Muck Boat a Novelty

(*Continued from preceding page*)

another muck hole was handled in a similar manner. One of the interesting features of the job was found at Sta. 188 where the road was being relocated. On the blue prints a small pond to the south of the road was plainly labeled as "Armco Lake". It seems that at this point one of the earliest demonstrations of an installation of Armco corrugated culvert was made to prove the strength of the corrugations in this then new type of pipe. Apparently the success of the installation led to the naming of the body of water.

Just east of the 1,300-foot gap in the contract another muck hole was met at Sta. 245.

The Muck Boat

No description of this project would be complete without interpolating a description of a novel mode of transportation employed by the engineers in making muck surveys and checking channel sections. The so-called "muck boat" consisted of four 10-foot 2 x 4's cut in halves lengthwise to form 1 x 4's and lashed together to form the old ticktack-too pattern. Then five inflated inner tubes from motor trucks were lashed to the frame work to form two lines across the center. On top of this framework a 4-foot square sheet of 3-ply wood was nailed to form the raft section. Surprising as it may seem, this unusual boat was capable of supporting three men without tipping and was used most successfully by T. L. Sharples and Stuart MacPherson, the associated "naval designers," who were members of the survey party.

Unfortunately, when we saw the boat it was standing on end in the blacksmith shop of W. E. Marcy, who has operated at his trade for 42 years. The shop has been in his family since 1818. The original anvil used by Grandfather Marcy, Father Marcy, and the present smithy, is now mounted on a stone in the family lot in Abington Cemetery, adjacent to this highway project. Mr. Marcy has shod between 40,000 and 50,000 horses and he still had 892 pairs of shoes left which he fears he will never be able to use up.

Unclassified Excavation

The use of the term "unclassified" in describing the excavation on this job is as true a use of the word as we have ever seen. When the right-of-way had been stripped no one could possibly guess whether the outcrops of rock were small boulders, enormous boulders or solid ledge. Only a very short section of the entire job was free enough of boulders to permit the use of scrapers for the removal of the earth.

The first major cut extends from Sta. 18 to 48 and then crosses the road to Sta. 75 at a landmark known as Frog Rock. An amateur artist merely had to add an eye to the profile of a rock which has stood at the side of the road for many years to give an excellent silhouette of a huge bull frog. During the past winter one-half of this boulder cracked off but, fortunately, did not destroy the silhouette. Approximately 25,000 cubic yards of excavation was taken out in the 500 feet between Sta. 30 and 35. This is the largest single cut on the job and ran up to 22 feet deep. A new 1½-yard Northwest shovel loaded material out of this cut to two Sterling 5-yard trucks, one Autocar and one Mack, all used without tailgates because of the number of boulders. The average haul was about 500 feet. A Caterpillar RD8 tractor with a LaPlant-Choate bulldozer was used to aid the shovel in the pit.

On the next major cut, around Sta. 50, a 2-yard Marion shovel with a Waukesha-Hesselman motor loaded to two AC Mack trucks with rock bodies and one BX Mack which hauled the material about 500 feet to dump into a muck hole. Working also in this section were a Universal truck crane mounted on an AC Mack, an RD8 with a LaPlant-Choate bulldozer, and an International TD-14 with a Bucyrus-Erie bulldozer. Boulders that were too large for the shovel to handle were broken down with an Ingersoll-Rand Jackhamer, equipped with I-R Jackbits, and driven by a Schramm 105-cubic foot portable compressor. This outfit worked up and down the job to take care of the left overs among the boulders.

At Sta. 74, where the relocation crosses the old road to the left side again, a 1½-yard Marion equipped with an Amsco bucket, like all of the other shovels on the job, and powered with a Caterpillar D13,000 engine, handled the loading.

At Sta. 85 is a 700-foot heavy rock cut in ledge. This was drilled with an Ingersoll-Rand power drill, an Ingersoll-Rand wagon drill and a Sullivan wagon drill, using Jackbits, with the deepest hole running to about 16 feet. These drills were powered by two

(*Concluded on page 26*)

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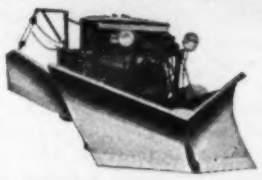

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IN THESE TIMES

Let's Face the Facts with Common Sense

THESE are *different* times than any of us have experienced. The *one* great common *goal* governs all our thinking and all our action. *All* of us must now face facts with *common sense* for a mutual solution of the problems of today.

One fact to be faced is this: there may not be enough new machines to go around. International Harvester will do its best to provide its customers with as much new machinery as possible. But plans laid today must be flexible enough to meet tomorrow's situation.

In such a time users can appreciate what International QUALITY and International SERVICE mean. International TracTracTors, Wheel Tractors, and Power Units are having to work harder and live longer. They're doing just that, because they are *designed* and *built* for the *long pull ahead.* A broad background of manufacturing, engineering, and metallurgical experience stands behind every tractor and engine carrying the International nameplate. International equipment is *proved all ways for come what may!*

But even the best machines need a regular program of servicing, preventive maintenance, and overhaul. Arrange with the International Industrial Power dealer for tractor and engine service and check-ups regularly. He is equipped to do a service job as never before, to help you prolong the useful life of your equipment. His service facilities, trained servicemen, and stocks of genuine IHC Parts are at your command . . . backed by 85 Company branches coast to coast.

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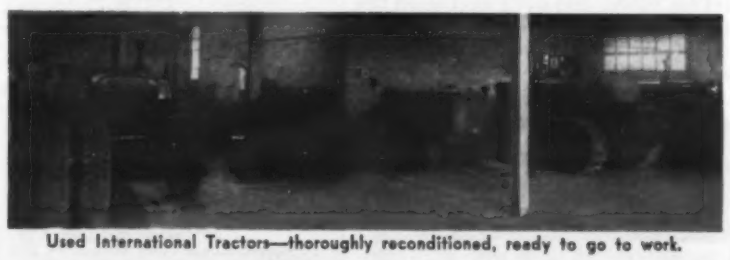
Putting a new angle on a road grade at low cost with an International Diesel-powered grader.

Two International UD-18 Diesel Power Units operating lime crusher.

A neat, orderly parts department in an International Industrial Power dealer's store.



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GRAND RAPIDS • MICHIGAN

A Jaeger spreader-finisher laying bituminous resurfacing on the Barber Construction Co. contract west of Park Ridge, Ill.

Bituminous Resurfacing Old Concrete Highway

One of the problems in the bituminous resurfacing of old concrete roads with a leveling course where necessary plus a binder and top course is the removal of long depressions to insure a smooth riding surface at high speeds. To solve this problem in the resurfacing of a 40-foot pavement, just west of Park Ridge, Ill., in two lanes, the Barber Construction Co. of Chicago used a 20-foot Jaeger spreader-finisher operating on forms and later on the finished first lane. With this arrangement, the contractor not only produced results entirely satisfactory to the Illinois Division of Highway but also was able to maintain progress at the capacity of his material plant, attaining a rate as high as 14½ linear feet a minute on both binder and top course or from 120 to 150 tons an hour.

The old surface consisted of concrete which was to be covered with 1½ inches of binder and a 1½-inch top course of modified sheet asphalt. A 9-inch concrete form was set to the proper height outside the old concrete road and a 3-inch asphalt form was laid on the center with one pin per section driven in a hole drilled in the concrete. The center form was brought to grade by shims or shingles.

The binder was graded up to 1-inch stone and the top was a modified sheet asphalt to Illinois I-11 specifications, graded as follows, and heated to approximately 300 degrees:

Stone, ⅛-inch to No. 4	1,043 lbs.
Screening, No. 4 to 10	238 lbs.
Sand, No. 10 to 200-mesh	428 lbs.
Dust	156 lbs.
Asphalt cement, 60-70 penetration	145 lbs.

Trucks delivered the heated material direct to the hopper of the Jaeger spreader-finisher which pushed the trucks ahead while receiving the material. Two-way power screws on the machine then spread the material across the grade and well against the forms. An oscillating-type finishing screed, equipped with a spring strike-off when laying binder course, then struck off the material ready for the roller.

The general procedure was to lay binder one day and follow the next day with top, continuing down one-half of the road for approximately 4 days, then moving back and completing the other lane. In laying the first half, the screed worked on the forms, using a vertically adjustable strike-off to obtain the correct level for binder and using dollies on the top course to provide approximately ½ inch of material above the forms for compaction. On the second lane, the machine was carried on forms on the outside, the inside being carried on the finished surface of the first lane with the wheels riding on ½ x 6-inch steel strips 10 feet long.

Forward progress on binder was at the rate of about 14½ feet a minute which, on the 20-foot lane with 1½-inch compressed thickness, was equivalent to 32 square yards or 2.4 tons a minute. On top course the forward speed was between 8 and 10 feet a minute but, when the temperature of the mix was kept up to 300 degrees, the forward progress increased to 14½ feet a minute or the same as on binder. In other words, with trucks coming without delay, material was handled at the rate of 120 to 150 tons an hour. Due to plant limitations, the maximum daily run in 8 hours was approximately 3,600 linear feet.

The crew consisted of one truck dumper, one operator, two rakers, two laborers and two tampers, which was the minimum union requirement for a crew.

New P & H Dealer

The Harnischfeger Corp., 4419 W. National Ave., Milwaukee, Wis., has announced the appointment of the Western Equipment & Supply Co., Rock Island, Ill., as its distributor to handle P&H excavators in that territory.

Self-Locking Nut Catalog

A complete and up-to-date catalog has recently been issued by the Elastic Stop Nut Corp., 2330 Vauxhall Road, Union, N.J., covering its line of Elastic Stop Nuts, which are now available in more than 2,500 combinations of type, size, thread system, and material, all embodying the basic Elastic Stop resilient non-metallic locking collar. According to the manufacturer, this self-locking action, which is immediate and automatic, combined with single-unit construction, makes them easy to apply and neither vibration, shock, nor hard service can loosen them. This self-locking principle is described in detail in the catalog, outstanding features are presented, and there are many illustrations showing a wide variety of applications. In addition specifications and prices are included.

Copies of this folder may be obtained by writing direct to the manufacturer and mentioning CONTRACTORS AND ENGINEERS MONTHLY.

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CONTRACTORS' SUPPLY DEALERS in every state sell the Fulton line. Specify SHURE-DRY and FULTEX Tents, Tarpaulins, and Windbreaks—anything made of canvas. Also Fulton Road Mats and Burlap. Fulton products are good and prices are right.
If your dealer can't supply you write our nearest plant for catalog, samples and price list.

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What is "AIR CUSHION" in a Paving Breaker?

How Does it Improve the Machine's Action?

★ Illustrated at the left is the Cleveland C9 82-Pound Paving Breaker, one of the line of four. The others are, the C7, weighing 80 lbs., the C11, 56 lbs., and the light but powerful little C10, 32 lbs.

★ Among users of Paving Breakers there has been considerable discussion of late on the subject of the Air Cushion, an excellent feature which has always been used in Cleveland Paving Breakers ever since the earliest design, twenty years ago.

The sectional view shown here is typical of Cleveland paving breaker design. Note the forward air supply port, (L) and the hammer, or piston, (P). When the forward edge of the hammer passes the port (L), compressed air is trapped in the front end of the cylinder at (D), effectually preventing the hammer from making metallic contact with the front end, the tappet bushing, (B). It is easy to understand that this prevents breakage of parts, including the side rods, which must stand the strain of blows struck on the front end when the hammer over-runs, due to drawing the tool back from the work, and when no Air Cushion is provided.

Any one, or all types of Cleveland Paving Breakers gladly demonstrated at your convenience. Select the one that does your work best.

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Cataphote Made Distributor For Scotchlite Reflectors

The Western Cataphote Corp., Toledo, Ohio, manufacturer of reflector buttons, has recently been appointed distributor for Scotchlite reflecting material for highway markers, thus enlarging their scope of service in the field of safety engineering. This new product, made by the Minnesota Mining & Mfg. Co., St. Paul, Minn., is a flexible fabricated reflecting material available in three colors, yellow, white and silver. Reflection is achieved through a precision surface coating of special glass polaroid lenses. Scotchlite is designed to provide a high degree of reflecting power and is recommended for warning signs and markers where long-distance visibility is essential.

Material-Handling Buckets

The Blaw-Knox Co., Pittsburgh, Penna., has recently issued a new bulletin on its line of material-handling buckets. Described and illustrated are two-line and three-line clamshells; medium-weight two-line lever-arm-type buckets for high-speed towers; two and three-line cement clinker buckets; and four-rope double-lever arm buckets for cement and stone plants. Action photos show the handling of various types of materials, while construction features are shown in close-ups, and brief specifications are given.

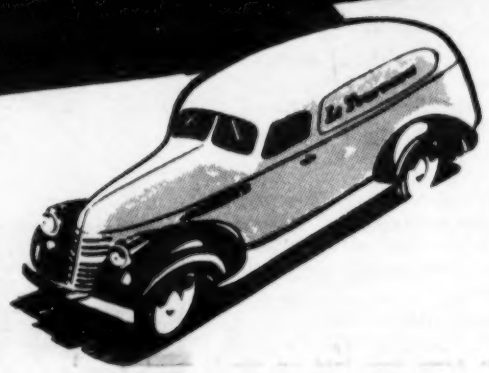
Copies of this bulletin may be obtained by writing direct to the manufacturer and mentioning this item.

New General Mgr. at Novo

The Novo Engine Co., Lansing, Mich., announced recently the appointment of R. M. Teel, formerly General Superintendent, as its new General Manager and Vice President. Mr. Teel has been with Novo for seven years and had fifteen years experience previously with the Reo Motor Car Co.

To Keep Your Equipment Operating at Peak Efficiency

USE LeTOURNEAU 7 STAR EQUIPMENT & REPAIR SERVICE



To help you maintain night and day schedules . . . to keep older equipment operating steadily you now need complete equipment and repair service more than ever. For that reason LeTourneau-"Caterpillar" distributors, already rated as the world's best equipment service organization, have developed this 7 Star Program. It's designed to keep big yardages moving profitably. Here's what it offers you:

★ **GENUINE PARTS QUICKLY**—Factory-made LeTourneau parts, Scraper blades, Dozer blades and end bits, Rooter shanks and shoes—carried in dealer stocks to serve you with a minimum delay.

★ **PREFORMED TOURNAROPE**—Made by LeTourneau especially for cable-operated, tractor-drawn equipment. Five sizes — 3/8", 1/2", 5/8", 3/4" and 7/8". Standard on LeTourneau equipment — ideal for replacement use.

★ **TOURNAWELD ELECTRODES**—More than 5,000,000 pounds of this welding rod have been used in the past 2½ years in the manufacture of LeTourneau equipment. Types and sizes to fill every field repair need.

★ **PROPER BEARINGS**—LeTourneau selected and approved bearings for all LeTourneau units.

★ **EXPERT SERVICE**—Why take chances? Your LeTourneau-"Caterpillar" dealer has a corps of experienced servicemen trained in efficient, time-saving repair practice.

★ **SHOP AND FIELD SERVICE FACILITIES**—Many LeTourneau-"Caterpillar" dealers are equipped with portable welding outfits to provide quick complete service in the field. All have adequate shop facilities.

★ **JOB PLANNING**—Ask your LeTourneau-"Caterpillar" dealer for job layout and estimating help. He has a wealth of helpful field engineering figures and facts; also can supply your superintendents and operators with time-saving operating ideas.

Make use of this 7 Star Service to get "lowest net cost per yard."

LeTOURNEAU
PEORIA, ILLINOIS • STOCKTON, CALIFORNIA

CARRYALL* SCRAPERS, ANGLEDOZERS*, BULLDOZERS, ROOTERS*, POWER CONTROL UNITS, TRACTOR CRANES, PUSHDOZERS, SHEEP'S FOOT ROLLERS, TOURNAPULLS*, TOURNATRAILERS*. TOURNACRANE.

*NAME REG. U. S. PAT. OFF.

Frost Boil Fighting In Northern Ontario

Heavy Clay, Heavy Traffic Over Old Road Subjected To Low Temperatures Make Maintenance Difficult

✦ THE heavy clay subgrade of Ontario Highway 11 north from Cobalt to New Liskeard has created a difficult spring and summer maintenance problem because of the penetration of frost to depths of 8 to 10 feet during the freezing weather from late October to the first of May. This section of Highway 11 has the heaviest traffic of any portion, because of the interurban trucking of high-grade hand-picked cobalt ore from Cobalt north to the government concentrator. This section of road has grown from an old moose trail to its present importance without real reconstruction; hence, it has not even had drains placed at the side of the pavement. The frost comes out of the ground usually by late May, but has been known to continue to come out as late as August.

Incidence and Signs

On the 7 miles of highway between Cobalt and New Liskeard there are from four to five boils per mile, of which perhaps only one in each group is bad enough to be a hazard to traffic. These bad boils remain 12 to 15 inches high until they have thoroughly dried out. In order to warn traffic of this hazard, the Ontario Department of Highways Division 14 has erected a sign just north of Cobalt, reading:

FROST BOILS HERE TO NEW LISKEARD, DRIVE CAREFULLY

About 500 feet on each side of a group of boils, and they usually do occur in groups, the Highway Department puts out a sign, "Bump," and then a small red flag is displayed on the shoulder opposite the actual location of the boil. Thus traffic is adequately warned of this potential hazard; but unfortunately truck drivers like the looks of the red flags and they frequently disappear so that there is no warning of the actual location of the boil.

Caring for the Boils

Since the highway is lacking in drainage, there is nothing to do but wait until a boil has come up to its full height, then fill in the depressions at either side with fine rock or gravel mixed with calcium chloride, which helps to hold this filling material and also, as it sinks into the ground, speeds up the removal of the remaining frost in the ground. Then, as the boil subsides, the excess material is bladed off to the side of the road. When the boil finally comes to rest, the damaged section of the hot-mix bituminous pavement is broken out and patched. If there is any soft clay remaining at the break, it is dug out and backfilled with coarse rock and gravel, and then an extra-thick patch, 4 to 5 inches, is made in the pavement, which is rolled with a rubber-tired tractor which has been converted to a 5-ton roller.

Various kinds of bituminous cold-patch material have been tried, including tar, cut-back, and asphaltic cold-mixes. They all seem to be equally satisfactory. Stockpiles of the cold patch are kept in readiness for the repair operation when it is necessary.

Method of Elimination

On the newer sections of Highway 11, north of New Liskeard, the frost boils have been eliminated almost entirely by carefully prepared trenches at the side of the pavement immediately adjacent to the paved way. These trenches are dug by trench excavators of the wheel or bucket type to at least 4 feet below the pavement surface, and sometimes to as deep as 6 feet, and 18 inches wide. Agricultural tile 6 inches in diameter and mostly of concrete spun pipe is laid in the bottom of the trench with butt joints and with tar paper over each joint to prevent backfilled material entering the joint. The trench is then backfilled its full width and to the top with 2-inch down to ½-inch gravel or crushed limestone, carefully screened to remove all fines. Great care is taken in the maintenance of these trenches to keep clay from working into the top. If there is any sign of the top of the drain becoming filled up and clogged in any way, about 6 inches of the material is plowed out and replaced with new stone.

Personnel

Division 14 of the Ontario Department of Highways, known as the South Cochrane and New Liskeard Division, is under the direction of Victor Longstaffe as Division Engineer. A. A. Smith is Chief Engineer, Ontario Department of Highways.

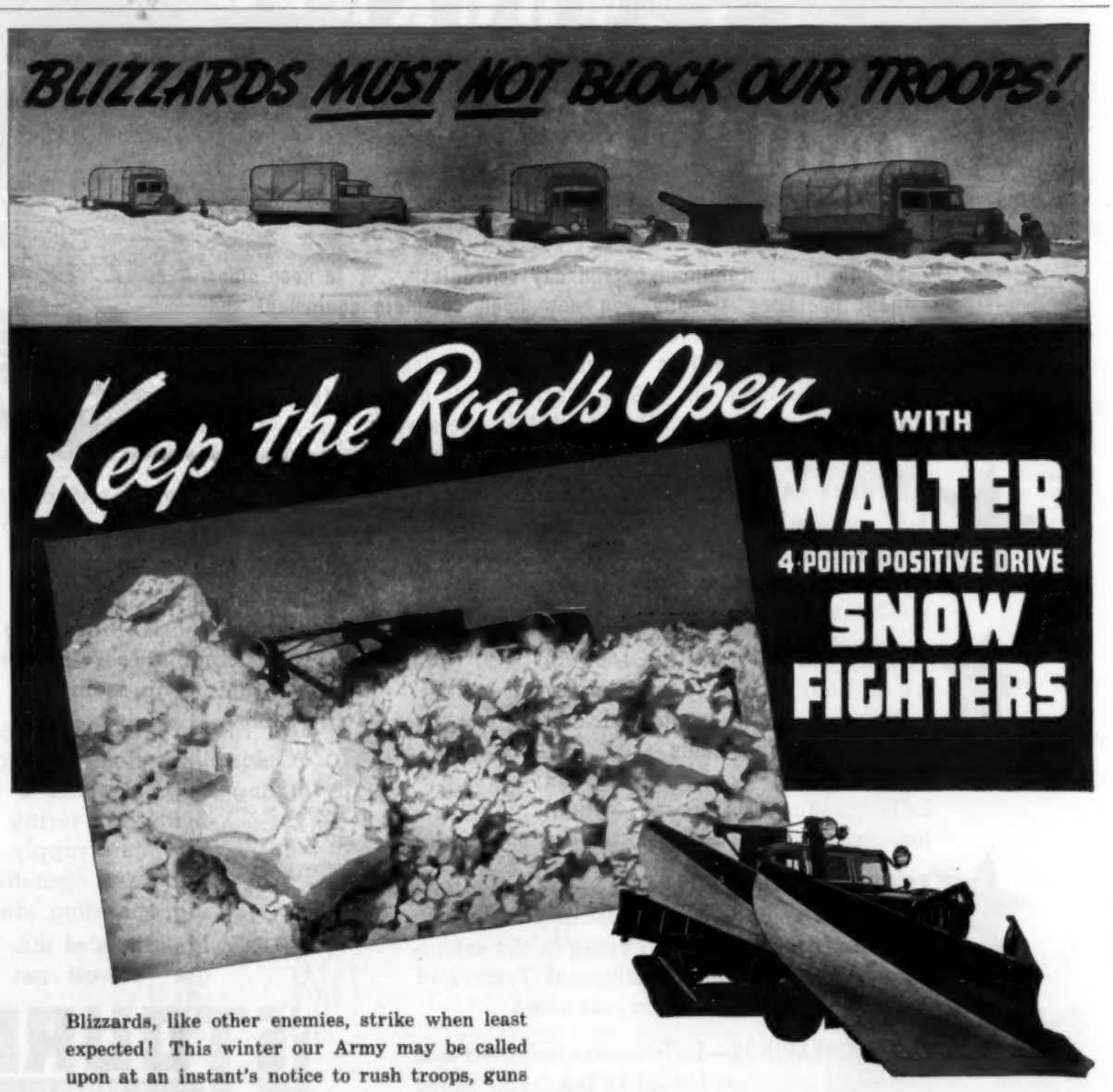
Proper lubrication and careful maintenance will keep your equipment operating at maximum efficiency.

New Electric Saw

The addition of a new 8¼-inch portable electric saw to the line of Skilsaw electric tools has recently been announced by Skilsaw, Inc., 5033-43 Elston Ave., Chicago, Ill. This new Model 825 is a fast-cutting tool for wood, steel, lead, copper and composition material. It will cut to a depth of 2⅝ inches in wood, bevel-cut lumber up to 2⅛ inches thick at 45 degrees, cut aluminum and copper up to ½ inch thick, and lead to 1 inch thick.

The Skilsaw Model 825 is 18 inches long, weighs 18½ pounds, and its blade has a free speed of 3,000 rpm. It is protected by an automatic telescoping guard which rotates on ball bearings. Every moving shaft is also mounted on ball bearings for quiet operation and long life. Power is furnished by a universal motor.

Further information on this new saw and its many applications may be secured direct from the manufacturer by mentioning this item.



Blizzards, like other enemies, strike when least expected! This winter our Army may be called upon at an instant's notice to rush troops, guns and supplies to meet threat of attack at many points. Bad weather or not — they *must* get through . . . and your job is to speedily, thoroughly clear the way, no matter how sudden or severe the blizzard.

Meet the crisis with WALTER SNOW FIGHTERS — the most rugged, unfailing snow removal equipment on the road. Their exclusive 4-Point Positive Drive gives you FOUR powerful driving wheels, plus differentials that automatically proportion the torque to each wheel according to its traction. This sustained power-plus-traction supplies Walter Snow Fighters with the "dynamite" to blast through highest drifts without stalling—prevents wheel slippage on icy surfaces—keeps them going when all other trucks fail.

Snow removal this winter is more than a community job—it's vital to national defense. Be ready for any emergency with Walter Snow Fighters. Write today for detailed literature.

WALTER MOTOR TRUCK CO.
1001-19 IRVING AVENUE, RIDGEWOOD, QUEENS, L. I., N. Y.

SAND'S-STEVENS
Line & Surface LEVEL

Endorsed and Adopted by Road Builders and Contractors

Level is easily and quickly attached to line. Special feature construction prevents accidental detachment from line. Construction is sturdy, and accuracy guaranteed.

SAND'S LEVEL & TOOL CO.
8831 Gratiot Ave. Detroit, Mich.

91 Per Cent of Gas Used in This Country Powers Road Traffic

Motor fuel for highway use totaled 22,000,000,000 gallons in 1940 and for non-highway purposes 2,000,000,000 gallons, according to state reports compiled by the Public Roads Administration and recently announced. The highway-use total was an increase of 6 per cent over 1939, and the non-highway use an increase of 11 per cent.

According to these reports, the non-highway gasoline was used principally in agriculture, with industrial and commercial usage ranking second, and aviation third. Private and commercial use of motor fuel on the highways accounted for 21,418,000,000 gallons, while state, county and municipal highway use totaled 391,000,000 gallons. The gallonage for Federal use on highways amounted to 193,000,000 gallons.

States with a reported highway usage of more than a billion gallons include California, Illinois, Michigan, New York, Ohio, Pennsylvania, and Texas. Analyzed by months, the reports show that the highway use of motor fuel exceeded 2,000,000,000 gallons in June and August, while the February total of 1,400,000,000 gallons was the smallest for the year.

The monthly consumption figures by states showed similar variations, except for Florida where the month of greatest consumption on the highways was December, with a decline in consumption during the summer months.

28th Annual Michigan Highway Conference

The twenty-eighth Annual Michigan Highway Conference will be held at the University of Michigan, Ann Arbor, February 18 to 20, 1942.

The first morning will be devoted primarily to discussions of the relation of highways to war and post-war conditions, two of the speakers being Charles M. Upham, Engineer-Director of the American Road Builders' Assn., and Highway Commissioner G. Donald Kennedy of Michigan. The general theme of the afternoon will be discussions of recent developments in methods of construction and maintenance of various types of highways. At the evening smoker, Glenn C. Richards, who was recently appointed Chairman of the Detroit Defense Council, will discuss conditions as he observed them on a recent trip to London, England.

The Thursday morning session will have special reference to traffic engineering and highway safety, among the speakers being O. K. Normann of the U.S. Public Roads Administration, Sidney J. Williams of the National Safety Council, and Maxwell Halsey, formerly of the Yale Bureau for Traffic Research and recently appointed Executive Secretary of the Michigan State Safety Commission.

Thursday afternoon sessions on traffic control, and for state highway department engineers and for county commissioners and engineers will be held; while on Friday morning the County Road Commissioners and Engineers Association will hold its business meeting.

Portable Electric Tools Described in 1942 Catalog

The complete 1942 line of Thor portable electric tools is described in an attractive new 64-page catalog just issued by the Independent Pneumatic Tool Co., 600 W. Jackson Blvd., Chicago, Ill. Containing four major sections, the catalog gives complete descriptions, specifications and prices on Thor universal-type electric drills, drill stands, screw drivers, nut setters, tappers, saws, hammers, nibblers, grinders, sanders, polishers, and electric-tool accessories. Featured are the Thor ¼ and ½-inch capacity drills, and in addition the Thor-Nado electric hammer and the Thor nibbler.

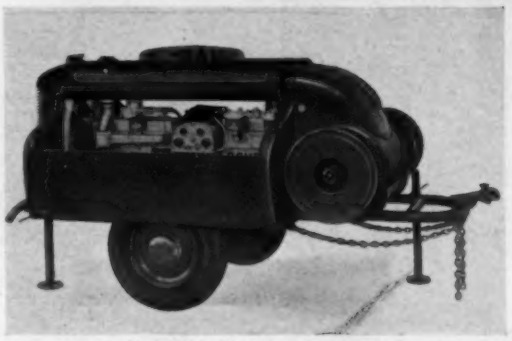
Copies of this Catalog No. 37 may be secured by those interested direct from the manufacturer.

New Bulletin on Hydraulic Bulldozers, Gradebuilders

A new 28-page bulletin has recently been issued by the Baker Mfg. Co., 585 Stanford Ave., Springfield, Ill., graphically presenting the construction features and performance of Baker bulldozers and gradebuilders with their direct hydraulic lift and down pressure. Information is given about the hydraulic cylinder linkage which provides a horizontal moldboard even with the tractor tracks at different levels; complete specifications are included; and action photographs show Bakers at work on highways, flood control, defense, bridge approach grading, and other projects.

Copies of this bulletin, No. 834, may be obtained from the manufacturer.

QUICK STARTING . . . . .
EASY HANDLING . . . .



Model No. 105, Gasoline Powered
Built in sizes 20 to 420 actual air, gasoline or diesel powered

With a modern Schramm compressor . . . two features that save time and money . . . built-in electric self-starting—push the button — instant air. Light weight . . . less weight to move . . . saves trucking expenses.

SCHRAMM, INC. WEST CHESTER, PA.
DEALERS IN PRINCIPAL CITIES

"We had to get the job done before the rains — so we put five Austin-Western "99M's" to work, and NOW WE ARE UNDER THE WIRE."

Charles L. Harney
(Contractor—San Francisco)

This $1,500,000 contract is a vital part of the Government Defense Housing Project at Vallejo, California. It covers the grading and paving of 7½ miles of streets and roads . . . requiring an estimated 178,000 cubic yards of excavation and dirt moving.

A motor grader without power on the front wheels is like a draft horse with roller skates on his front feet.

● The value of the "99M's" greater working weight . . . demonstrated so effectively at Vallejo . . . quickly makes itself felt on any job. In addition to handling all types of construction or maintenance jobs in record time, the "99M" assures substantial savings in power and operating costs . . . savings made possible by the live pulling power on front wheels, which eliminates the drag on engine power caused by 3 to 4 tons of front end dead weight.

Ask for a demonstration and see for yourself what the "99M's" greater working weight means in terms of capacity, power saving and extra range of usefulness. THE AUSTIN-WESTERN ROAD MACHINERY CO., Aurora, Ill.

Motor Graders • Loaders
Blade Graders
Elevating Graders
Hydraulic Scrapers
Crushing and Screening Plants
Cable Scrapers
Rollers • Roll-A-Planes
Motor Sweepers
Bituminous Distributors
Shovels and Cranes

Austin-Western

Bureau of Reclamation Photo

CLIFF WORKERS. High on the west abutment cliff at Shasta Dam in California, workers continue the excavation of weathered rock in order to provide solid support for this end of the structure. The concrete pouring, under way on many parts of the dam, has not yet reached this section of the foundation.

CITY BLOCK. The massive concrete structure which will be Shasta Dam rises up into the clouds. More than a city block thick at the base and now almost that high, the dam will reach an elevation of 602 feet above its lowest foundation. This particular section, now up 295 feet, will be about 520 feet high when completed.

Bureau of Reclamation Photo

Bureau of Reclamation Photo

PENSTOCKS. At a special steel plant at Coram, Calif., [illegible] from Shasta Dam, the power penstocks for [illegible] being fabricated. The full sections, 20 feet long, 15 feet in dia[illegible] up to 37 tons, are hauled to the dam on trailers and swung int[illegible]

• • • —

PANAMA CUT. One of the fleet of dirt-movers with Gar Wood special combination rock and dirt 12-cubic yard bodies and arm-type hydraulic underbody hoists which are speeding work on the third set of locks at the Panama Canal. Now, more than ever, is the speedy completion of these additional facilities at the Canal vital to this country's welfare.

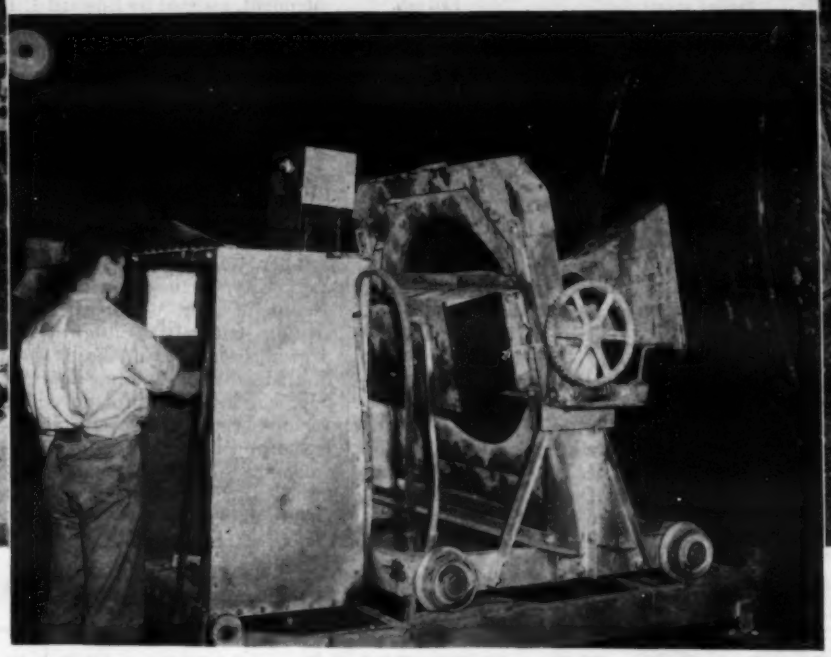
TOUGH GOING. Whether it be on heavy-duty construction jobs or in tough going for our fighting forces, the "Jack-of-All-Trades" crawler tractor is playing an important part in the war effort of this country. Here International TD-18 TracTracTors, many of which are active on construction jobs all over the country, pull 155-millimeter guns for the Field Artillery over rough terrain at Fort Sill, Okla.

'DOZING ROCK. In Jacumba Pass in California, a Caterpillar D8 tractor with a LeTourneau bulldozer moves rock in a 150-foot cut on a 1.3-mile highway job. Three D8's with bulldozers were on the job, working two 8-hour shifts. Other equipment included two Gardner-Denver compressors and a 1¾-yard shovel.

...Calif., ...downstream ...ks for ...t dam are ...in dia... ...d weighing ...g int... ...y cableway.

X-RAYED. To make sure there are no flaws in the welded plate-steel penstocks for Shasta Dam, 21,000 X-ray pictures are being taken by this special camera in the fabrication plant. Every weld in each big section of pipe must pass the rigid X-ray test before it is accepted by the Bureau of Reclamation.

Bureau of Reclamation Photo



Bureau of Reclamation Photo

INSTALLED. Sections of the five steel penstocks being assembled and installed in the west abutment section of Shasta Dam. These giant pipes 15 feet in diameter will extend through the dam and down the slope at the upper right to the powerhouse, carrying water to turn five turbines of 103,000 hp each.

...O-FISTED. American welders have their hands full ... the required war production, but R. H. ... of St. Louis proves that production ...e doubled. He is shown here welding ...r rollers with both hands, using a ...mpere Lincoln portable welder on his ... and a 150-ampere welder on his left.

QM DEPOT. At a new Quartermaster Corps Depot at Fort Worth, Texas, three Caterpillar DW10 tractors and LaPlant-Choate Carrimor scrapers handle excavation for the railroad and buildings.

with a ...1.3-mile ... Other ...l.

...RAFTED from civilian to military service. The familiar tractor-mounted-crane which has handled so many jobs for contractors and state and county ...ghway departments, such as removing the engine from a piece of equipment for repair ... unloading pipe or steel, turns with the rest of the country to serve our armed forces. Here a TracTracTor with a crane is handling airplane bombs.

ORDNANCE and still more ordnance is the answer to our enemies and the way to victory. At the huge Ravenna, Ohio, Ordnance Plant for loading shells, for which Hunkin-Conkey Construction Co. is the general contractor, this Barber-Greene portable belt conveyor places earth inside an "igloo" for curing the concrete.

Conn. Main Highway Relocated, Improved

(*Continued from page 19*)

Schramm 320-foot compressors. The holes were shot with American Cyanamid & Chemical Co. 40 per cent dynamite, hand fired in series making it possible to fire as many as 200 holes in one shot. At Sta. 101+50, where the road crosses back again to the right of the old road, it runs into a heavy rock cut 1,500 feet long, which contained about 27,000 cubic yards of excavation. The contractor's office was located at Sta. 125 and just beyond this the excavation was confined to taking out a few wiggles in the old road by removing a few cubic yards from one side, and then from the other. At Sta. 155, the relocation switched over to the left again and at Sta. 170 crossed back to the right. Immediately beyond Armco Lake at Sta. 188 the new location swung to the north, or left, to avoid an old cemetery.

At the east end of the job about 90,000 cubic yards of earth was left until later in the work when three Euclid scrapers were available from other contracts and could be shipped to the Pomfret job to move out this unit of excavation. Another 1½-yard Northwest was moved early in June.

Sub-Base Gravel

The Superintendent had to do considerable investigating to locate suitable gravel pits within reasonable hauling distances. One was located about ½-mile from the west end of the job which provided suitable gravel for gravel sub-base which was placed 1 foot deep in all cuts and 2 feet deep in rock cuts. None was placed on the top of fills. A layer of 1 foot of gravel was required under culverts.

Behind the office at Sta. 125, the contractor located an excellent sand bank for use as binder on the base course of the bituminous-macadam pavement. No gravel was located in the middle of the job but at the east end, about ½-mile from the actual end of the contract, a good bed of gravel was found in a river bed and a contract signed for its excavation after numerous test pits had been sunk. Thus, all of the gravel for the sub-base was hauled into the job from the two ends.

Roadway

The completed roadway has a 26-foot surface of bituminous macadam with 1 foot of bituminous-concrete lip curb between the roadway surface and the shoulder. The surface course consists of bituminous macadam 2½ inches thick after compaction. The base course of the bituminous macadam is broken stone with sand filler 6 inches deep after compaction and was laid in two 3-inch courses. The details of the paving will be described in a subsequent article.

Major Quantities

The major quantities on which this contract was bid included:

Unclassified excavation	219,621 cu. yds.
Bridge excavation	3,545 " "
Trench excavation up to 6 feet deep	8,795 " "
Trench excavation 6 to 10 feet deep	730 " "
Formation of subgrade	98,777 sq. yds.
Shaping and cleaning slopes and shoulders	31,775 lin. ft.
Sub-base gravel	23,860 cu. yds.
Gravel fill	320 " "
Broken stone for base course	37,863 tons
Broken stone for bituminous-macadam surface treatment	16,089 tons
Rolled gravel surface	2,055 cu. yds.
Stone for drains	325 tons
Bituminous material for surface treatment	7,950 gals.
Bituminous material for bituminous-macadam surfacing	256,943 gals.
Sand cover	10,600 sq. yds.
Class A concrete	1,591 cu. yds.
Class B concrete	322 " "
30-foot timber piles	2,520 feet
Driving piles	2,520 "
Portland cement	2,811 bbls.
Reinforced-concrete pipe, 15-inch	896 ft.
Reinforced-concrete pipe, 18-inch	792 ft.
Reinforced-concrete pipe, 24-inch	568 ft.
Reinforced-concrete pipe, 30-inch	270 ft.
Reinforced-concrete pipe, 36-inch	80 ft.
Reinforced-concrete pipe, 48-inch	68 ft.
Asphalt-coated corrugated-metal pipe, 10-inch	554 ft.
Perforated asphalt-coated corrugated-metal pipe, 6-inch	17,890 ft.
Outlets for drainage pipe	1,262 ft.
Standard catch basins	6
Standard metal manholes	37
Asphalt-coated corrugated-metal drop inlets	26
Bituminous-concrete lip curbing	48,555 ft.
Wire-rope railing	20,400 ft.

The contractor used Socony fuel for gasoline and diesel equipment, Socony oils and lubricants throughout this job.

Personnel

This contract for 6 miles of improvement of U. S. 44 in the Towns of Eastford and Pomfret, Conn., was awarded to M. A. Gammino Construction Co., of Providence, R. I., by the Connecticut State Highway Department, William J. Cox, Commissioner. For the State Highway Department, Walter M. Jones was Resident Engineer and D. J. Barnett, Engineer in charge of the project. For the contractor, J. F. Ableman was Superintendent, assisted by Edward J. Tillman as Assistant Superintendent, and Joseph Hemberger, Assistant Superintendent in charge of structures.

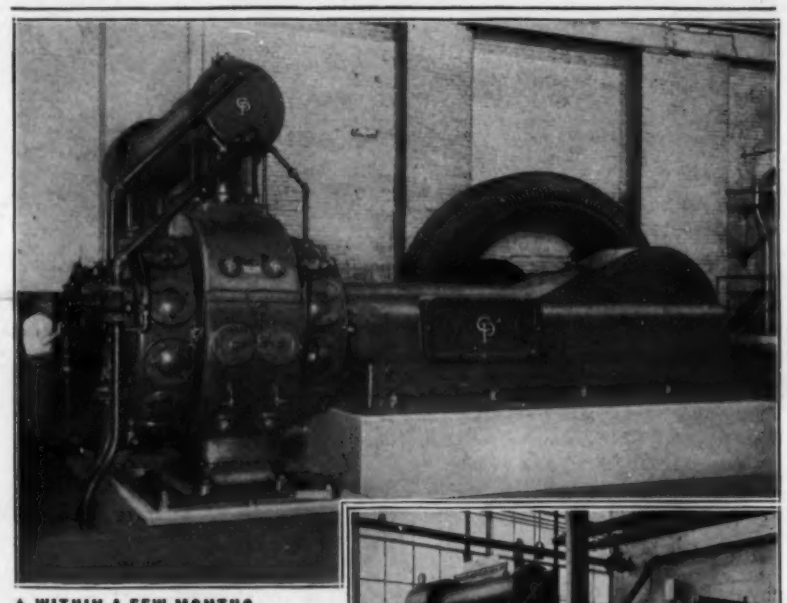
New Rubber Hose Manual

A new hose manual entitled "Eight Plies of Useful Hose Information" has recently been issued by the Mechanical Goods Division of the United States Rubber Co., Rockefeller Center, New York City, in the form of an enlarged section of hose, with each page representing one ply. Cut-away sectional drawings show steam hose, water, suction, air, oil and gasoline hose, and each page carries a "helpful hose hint". The various types of hose are clearly illustrated and brief descriptions are given.

Copies of this manual may be obtained direct from the manufacturer by mentioning this item.

★ ★ ★ ★ CHICAGO PNEUMATIC NEWS ★ ★ ★ ★

O-CE COMPRESSORS TO DEFENSE INDUSTRIES



EIGHT 6,000 C.F.M. COMPRESSORS RUSHED TO EASTERN SHIPYARDS

Model Noted For Dependability

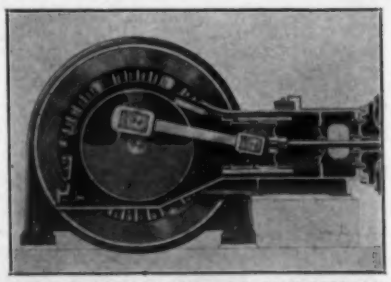
NEW YORK—Familiar equipment in new shipyards, aircraft factories and other defense plants are Chicago Pneumatic O-CE Horizontal-Duplex Compressors. Sound in design and ruggedly built, these popular compressors are ideal for continuous, heavy duty operation. The large effective area of their well-known Simplate Valves insures minimum power consumption. Their five-step regulation, low maintenance cost, outstanding reliability and other CP features make them the logical selection for plants which must have dependable, 24-hour-a-day air power.

CHICAGO PNEUMATIC TOOL COMPANY

General Offices: 6 E. 44th St., New York, N. Y.

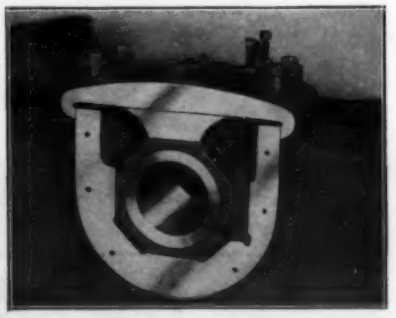
↑ **WITHIN A FEW MONTHS,** thirty-five Chicago Pneumatic O-CE Horizontal-Duplex Compressors were installed in well-known shipyards. This popular compressor is available in capacities of 350 to 10,000 c.f.m.

SYNCHRONOUS MOTOR-DRIVEN → O-CE Compressor, 800 c.f.m. piston displacement, in well-known aircraft plant. Simple, efficient, five-step regulation varies the output to meet load.



↑ **CP FLOOD SYSTEM OF LUBRICATION** assures maximum reliability. No pump or other working parts to fail and endanger running gear; no small oil lines to clog. This method provides all bearings with a copious supply of oil which also serves as a coolant and returns to the pump to be used again.

ACTUAL MEASUREMENTS PROVE that CP Simplate Valves, with their annular ports and straight, uniform lift, possess the greatest effective area for a given valve diameter, thus assuring lower power consumption. Straight valve lift, together with low air velocities resulting from large effective area, account for the remarkable endurance of these valves. ↓



↑ **MAIN BEARINGS** of two-piece design are easy to align and adjust—vertically by shims, and horizontally by wedges. Can be adjusted with the machine in operation; can be removed and replaced without lifting out the shaft.

CHICAGO PNEUMATIC

AIR COMPRESSORS

ALSO: Pneumatic Tools, Electric Tools, Rock Drills, Hydraulic Aviation Accessories, Diesel Engines

PORTABLE — STATIONARY — AIR OR GAS — MOTOR DRIVEN — STEAM DRIVEN — DIESEL ENGINE DRIVEN

ROBINS *RUBBERDISC RETURNS* RECEIVE RECORD RE-ORDERS

Customer A* agreed recently to try 8 RUBBERDISC Return Idlers, now he has 70. Customer B* started with 4 and has since ordered 230 more, while C* bought 2 at first and now has 125 Robins RUBBERDISC Idlers. Individual orders have amounted to over 200 Idlers.

Robins RUBBERDISC Return Idlers (Patented) evenly support the return strand of a conveyor belt. Sticky material cannot build up on the discs, and this, plus the gentle "rubber to rubber" contact, protects the belt and prolongs its life. RUBBERDISC Idlers also withstand abrasive and corrosive action better than ordinary metal idlers.

*Write right to Robins. The names of these and other pleased RUBBERDISC Idler users supplied on request.

ROBINS CONVEYING BELT COMPANY

PASSAIC, NEW JERSEY

New 310-Foot Overhead Improves Entry to City

Structure and Approach Fills Completed Under Separate Contracts; Eliminates Hazard Of Crossing Railroad Tracks

(*Photos on page* 48)

✦ THE old location of U. S. 12 as it entered the City of Milbank, South Dakota, from the west, not only involved numerous right-angle turns to get into town, but required crossing several railroad tracks where they divided for sidings. This hazard has been removed by the construction of a concrete overpass 310 feet in length, with long approach fills.

The Overpass

The overhead consists of a center span of 74 feet over the double tracks of the main line of the Chicago, Milwaukee, St. Paul & Pacific Railroad, with two 58-foot spans on either side. The bridge is on a 60-degree skew to the line of the railroad tracks.

The treated piles for the footings of the bents have a penetration from 22 to 26 feet, while the piles for the sill-type abutments are all driven to a penetration of 26 feet.

The major quantities in the bridge contract, which was awarded to J. C. Sorenson of Trent, S. D., and for whom Holgar Estervig was Superintendent, were as follows:

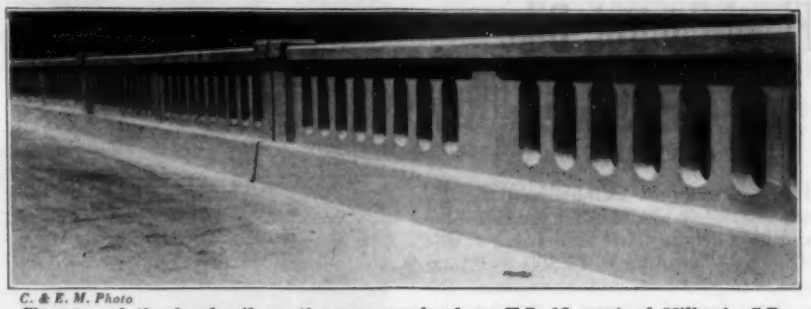
Structure excavation	1,130	cubic yards
Class A concrete	754.0	cubic yards
Hand-rail concrete	23.62	cubic yards
Reinforcing steel	112,345	pounds
Structural steel	350,530	pounds
Treated-timber piling	5,168	feet

The total bid for the bridge structure alone was $42,170.81. The concrete mix as designed for this job and which required 6.5 sacks of cement per cubic yard of Class A concrete were as follows, per sack of cement:-

1¼ to ¼-inch aggregate	295 pounds
Sand	190 pounds
Cement	1 sack
Water	6 gallons per sack

The field proportions for the structure concrete were 1:2.02:3.12, using screened and washed gravel aggregate.

Of special interest was the unusually good finish which the contractor secured on the hand-rail, with standard wooden cups attached to the inside and outside forms of the hand-rail to form the openings as shown in the accompanying illustration.



C. & E. M. Photo

Close-up of the hand-rail on the new overhead on U.S. 12 west of Milbank, S.D., showing the excellent finish of the hand-rail openings.

The Approach Fills

A separate contract was awarded to O. E. Miller of Lake City, S. D., for the two long approach fills to this overhead. The borrow excavation for these fills was 60 per cent wet, taken from the river bottom adjacent to the fill, and a part was supplied by a channel change which furnished some additional material. The fill was all placed by Gar Wood scrapers in the usual manner but the method of finishing the slopes was somewhat unusual. An Allis-Chalmers Model LO tractor was run along the top of the fill and then attached to it by a log chain to prevent slipping down the 2 to 1 slopes was an Adams leaning-wheel motor grader equipped with lateral movement of the moldboard. The grader worked along the top and then back down the slope, leaving a true 2 to 1 slope, smooth and uniform.

The quantities on the grading contract which was awarded for $36,563.62 were as follows:

Removing trees 6 to 10 in. in diameter	32 trees
Removing trees over 18 in. in diameter	4 trees
Removing stumps, 6 to 18 in. in diameter	52 stumps
Removing stumps over 18 in. in diameter	5 stumps
Unclassified excavation	183,422 cubic yds.
Excavation, structure	135 cubic yds.
Cubic yards of ½-mile overhaul	150 units
Installing 8-inch water main	192 feet
Water for compaction, 1,000-gallon units	366 M gallons
Culvert pipe, 18-inch reinforced concrete	624 feet
Underdrain, 12-inch vitrified tile	40 feet
Underdrain, 10-inch vitrified tile	450 feet

We are indebted to the Resident Engineer, F. B. Patterson, for the photographs showing the tractor and grader finishing the slope, and also for the photograph of the railroad's locomotive crane setting the girders for the contractor, both of which appear on back page.

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For capacity comparison, ½" cable used:
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5-Ton "General Utility" ..... 250 ft.
15-Ton Triple-Geared "Special" .....1200 ft.
Patent instant gear change and positive internal brake that never fails, and will lock load. Price, f.o.b.

Gear Ratios	Weight	Seattle
2-Ton 4, & 22 to 1.....	60 lb.	$ 50
5-Ton 4, & 24 to 1.....	110 lb.	$ 75
15-Ton 4, 19 & 109 to 1....	680 lb.	$250

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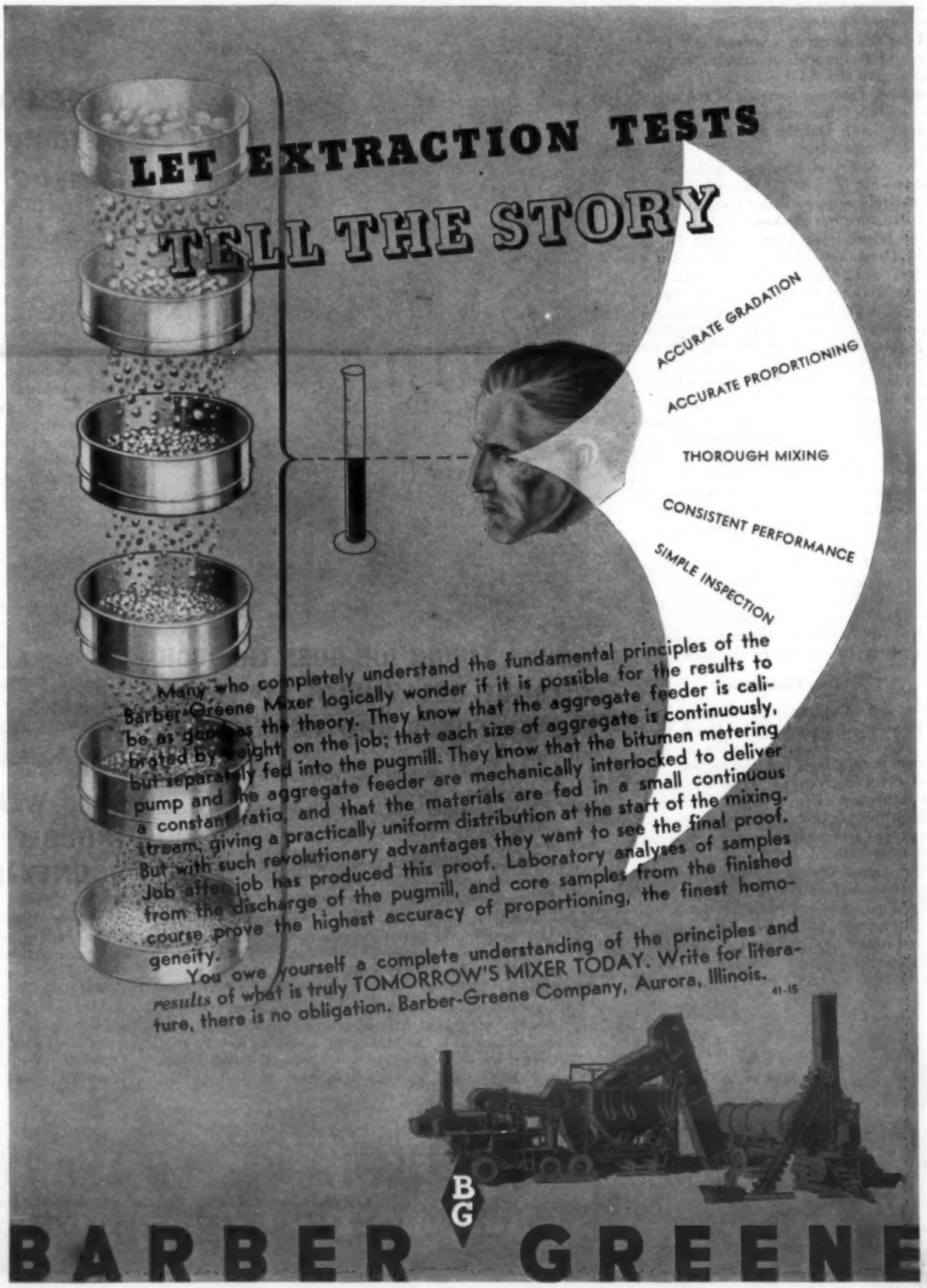
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Many who completely understand the fundamental principles of the Barber-Greene Mixer logically wonder if it is possible for the results to be as good as the theory. They know that the aggregate feeder is calibrated by weight on the job; that each size of aggregate is continuously, but separately fed into the pugmill. They know that the bitumen metering pump and the aggregate feeder are mechanically interlocked to deliver a constant ratio, and that the materials are fed in a small continuous stream, giving a practically uniform distribution at the start of the mixing. But with such revolutionary advantages they want to see the final proof. Job after job has produced this proof. Laboratory analyses of samples from the discharge of the pugmill, and core samples from the finished course prove the highest accuracy of proportioning, the finest homogeneity.
You owe yourself a complete understanding of the principles and *results* of what is truly TOMORROW'S MIXER TODAY. Write for literature, there is no obligation. Barber-Greene Company, Aurora, Illinois.
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BARBER GREENE

Flood-Control Dike Carries New Highway

(*Continued from page* 1)

There is a 2-foot fall between the 25-mile southern section of Lake Traverse and its northern part, Mud Lake, at this structure. The dike is 14,500 feet long and is topped by a 26-foot roadway, the contract for which was awarded to the M. E. Lien Construction Co. of Veblen, S.D. The 12,300 feet of the dike in Minnesota, which is 3 feet lower than the South Dakota section and will be the overflow section, has 1 on 8 side slopes, while the South Dakota section of 2,200 feet has a 1 on 4 slope on the south or upstream side and a 1 on 3 downstream slope.

The Dike and Structures

Reservation Highway is in reality a dike built over an old highway fill which was raised a maximum of 3 feet and relocated at the west end for a distance of 4,300 feet with an 8-foot embankment. The entire raising of the embankment and the new location was from side borrow and made with scrapers. The flat slopes give the dike a streamlined appearance. The new location of the highway included the entire 2,200-foot section in South Dakota and about 3,000 feet in Minnesota.

The control structure and highway bridge were built at the same point but are entirely separate structures, the control structure having been built as part of the White Rock Dam contract (C. & E. M. December, 1941, page 2) and the bridge, a 120-foot structure, built by Teberg & Berg, contractor of St. Paul, Minn., for the Minnesota State Highway Department. It is of steel construction of Bethlehem H beams, four per bent, and with three bents. The abutments are Z-section sheet piles and standard Bethlehem sections for the upstream wings. The downstream wings of the abutments are of similar construction but are a part of the control structure built by the U.S. Engineer Dept. The highway bridge was in part salvaged from a structural steel bridge on the old highway to the south which was relocated under the present project.

The control structure consists of stop logs in H piling set in concrete and with two Calco sluice gates in 24-inch corrugated metal culverts. These are used to control the level of the conservation pool in the lake south of the structure.

Paving Problems

The choice of methods of operation, optimum moisture, methods of pulverizing the soil, and the selection of the proper proportions for the cement all were exceedingly difficult on this particular project because of the character of the heavy clay or gumbo. On one section it was necessary to replace the embankment material in the top 6 inches of roadway embankment for 4,100 feet because it was found practically impossible to pulverize in place with any of the equipment available. The gumbo when broken up resulted in clay balls from 2 inches down to ½ inch in diameter which were like rock.

C. & E. M. Photo
The downstream side of the highway bridge and control structures on Reservation Highway in Minnesota and South Dakota.

Soil-Cement Operations

The preparation of the soil in the highway for the addition and mixing of the cement was done in 1,000-foot sections. The material was scarified to a depth of 5½ inches and then turned over with a 3-bottom gang plow pulled by a Caterpillar D4 tractor. Following this a 22-inch Minneapolis-Moline single-way 10-disk plow, 12 feet wide, was pulled through the tough dry clay with a Caterpillar D7 tractor. This was followed with an orchard cultivator with high wheels pulled by an International Farmall or a D4 tractor and finally an Ariens hydraulic-controlled Aggmixer to continue the pulverizing of the soil until 80 per cent passed a No. 4 sieve.

In the black soil 16 per cent cement was required and 10 and 12 per cent in the clay drift which comprised most of the highway embankment. The cement was placed by sixteen men, six of whom loaded five trucks which hauled the cement out to the job, and ten men on the road distributed the cement in six or seven longitudinal rows, cutting the sacks and spreading the cement on the pulverized soil. The cement was first spread over the entire 26 feet uniformly by a spike-tooth harrow pulled by a Farmall tractor over the surface. The material was then bladed in from the side with a Caterpillar No. 12 power grader and then the soil and cement upset with the 3-bottom gang plow pulled by the D4 tractor. Then the orchard cultivator, in appearance like a light scarifier or rooter, was pulled through the material to give it a rough mixing, followed by a spring-tooth harrow or quackgrass cultivator 11 feet wide pulled by a Farmall Model M tractor. This spring-tooth harrow had wider shovels

(*Concluded on next page*)

TUNNEL LINING JOB GOES THROUGH WITHOUT DELAY WITH STANDARD DIESEL FUELS AND LUBRICANTS

The two most important pieces of equipment used by an Indiana contractor on the tunnel lining job pictured here were his Diesel driven compressors. Over 2,000 yards of rock had to be removed with air hammers. Any failure in the Diesels would stop all work.

When the job was finished, these engines had operated two shifts a day for over three months without a forced shutdown.

Right at the start of the job, this contractor eliminated a lot of trouble-making factors. He called in a Standard Oil Engineer. The correct fuels and lubricants were recommended for both the Diesel and gasoline powered equipment. The necessary storage facilities and approximate delivery schedules were determined.

Then, with clean fuel and the right lubricants, always on hand when needed, equipment failures were cut to the minimum.

If you are located in the Middle West, or plan to take over a contract there, see a Standard Automotive Engineer before you start the next job. He may have many suggestions that will be profitable to you.

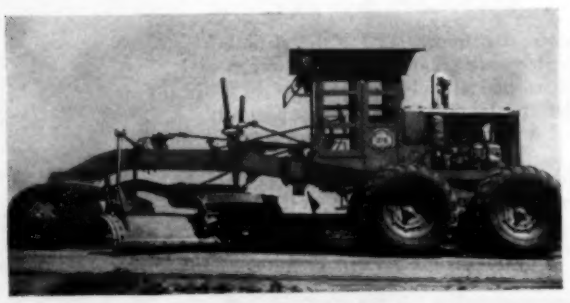
HERE'S WHAT A STANDARD AUTOMOTIVE ENGINEER CAN DO FOR YOU NOW!

Right now your gasoline and Diesel powered equipment may not all be busy on the job. If so, now is the time to see what a Standard Automotive Engineer can do for you.

Put him to work with your maintenance men. See if his experience with fuels and lubricants and his instruments for locating the weak spots in inefficient engines won't help your men speed up the reconditioning of your fleet.

Any special problems of engine varnish, oil sludging, or high fuel consumption can be analyzed more thoroughly now than when equipment is in the field.

This service costs nothing, but it may help you avoid breakdowns when your equipment is on the job next season. You can reach one of these Engineers by writing the Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago, Illinois. In Nebraska, write the Standard Oil Company of Nebraska at Omaha.



COLD-WEATHER STARTING NO TROUBLE NOW FOR A MINNESOTA COUNTY HIGHWAY DEPARTMENT

Snow piles high and the thermometer dips low about this time of year in northern Minnesota. But neither one is an obstacle now to a certain well-equipped county highway fleet in this region. There was a time when all the fine Diesel-powered snow-fighting equipment was threatened with being snowbound. Sudden cold snaps caused clogged Diesel fuel filters. It was almost impossible to start the engines.

But that's all changed. A Standard Automotive Engineer tested Stanolex Diesel Fuel on this equipment. The low pour point of Stanolex gave easy starting even at subzero temperatures.

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Methods of Building Soil-Cement Highway

(*Continued from preceding page*)

than ordinarily used which gave a very effective mixing action. This operation was followed by the final mixing with the Ariens Aggmixer or rotary tiller. Thus far the work was entirely involved in dry mixing.

The contractor maintained three tank trucks, two of 1,200-gallons capacity and one of 962-gallons capacity, each equipped with Jaeger pumps driven by Briggs & Stratton engines delivering the water under pressure to the spray bars. These trucks followed the dry mix, spraying the road until the optimum moisture of 18 per cent water was secured while the mixing operation continued.

After the cement had been mixed in and the water added, a double LaPlant-Choate sheepsfoot roller and a single Bros sheepsfoot roller were used to compact the material from the bottom up. This was followed by pulling the spike-tooth harrow behind one of the sheepsfoot rollers to cut the compaction planes left by the sheepsfoot roller as it neared the surface and to provide a mulch for final smooth-rolling. After the sheepsfoot roller had packed out, the Caterpillar No. 12 power grader was run over the surface to bring it to grade and section. The surface was then smooth-rolled with a Bros pneumatic roller. The top ¼ inch of the surface was bladed off and wasted, following which the 9-wheel pneumatic roller was again put on the top for the finish rolling ahead of the steel roller. The final rolling at first was done with a 10-ton roller but it was found that because of the resiliency or elasticity of the gumbo base the soil-cement blistered badly, so this was replaced with a 6-ton 3-wheel Galion roller which left a clean, smooth surface.

Just as soon as the application of water began following dry mixing, the pulverizing equipment moved ahead to the next 1,000-foot stretch to prepare the grade for the next day's mixing. The soil-cement surface was cured by covering with straw and wetting intermittently as long as the material would take up moisture. The straw was left on for 7 days.

Quantities

The quantities involved in the construction of Reservation Highway, including the new embankment, raising of the old highway fill, and the soil-cement surface, were as follows: excavation, borrow, 223,824 cubic yards; excavation, stripping, 111,213 cubic yards; excavation, channel, 2,272 cubic yards; temporary gravel surface (for winter service), 27,289 square yards; soil-cement road surface, processing, 37,209 square yards; cement, 5,058 barrels; water, 1,000-gallon units, 368 units; seeding slopes of embankment, 1,300 pounds of seed.

Personnel

The contract for the embankment and soil-cement surfacing was awarded to M. E. Lien Construction Co. of Veblen, S.D., on the submitted bid. The total completed cost of the operation, including all extra work orders, was $71,303.68. The work was done under the direction of the United States Engineer Dept., St. Paul, Minn., District Office, Major J. W. Moreland, District Engineer, with J. O. Ackerman as Resident Engineer on the dike construction and O. B. Emswiler as Resident Engineer on the soil-cement surfacing. For the contractor the work was in charge of J. D. McDonald as Superintendent.

Maintenance Engineer, Oregon Hwy. Dept., Dies

Jasper N. Bishop, Chief Maintenance Engineer of the Oregon State Highway Department, died on November 25 after a brief illness. Mr. Bishop, who was 52 years of age, had been continuously employed by the State Highway Department since 1920, with the exception of a short period in 1925 when he was an engineer for the Portland Southwestern Railway.

"Easy Wheeling"...YOU'RE SURE THAT THIS Simple METHOD Always PAYS!

Sterling wheelbarrow methods of material handling are simple, flexible and reliable . . . no "hidden costs"; low initial investment; long service; small upkeep . . . they simplify every estimate and every job. Ask Sterling how, now!

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Steel Reinforcing Rod around top edge

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Next time you buy wire rope for a hard-running job—get Bethlehem Purple Strand Form-Set.

Purple Strand means that the rope is 100 per cent Improved Plow Steel—the strongest, toughest steel used in the commercial wire rope business. Form-Set means that the rope is preformed—that it's easy to handle, won't wicker, spools smoothly and is more resistant to bending fatigue.

If you want the utmost in both flexibility and ruggedness, Purple Strand Form-Set is your rope.

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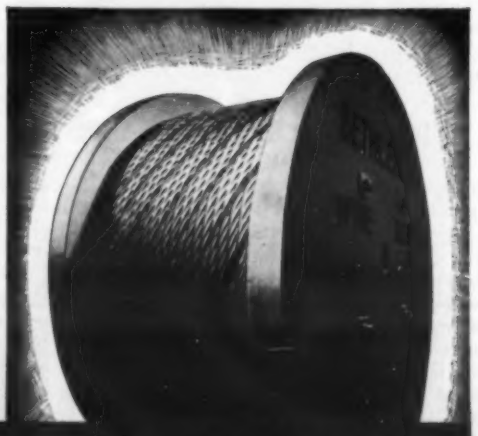

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Non-Extruding Expansion Joint
Plate-Dowel Expansion Joint
Sub-grade Felt

THE PHILIP CAREY MFG. CO.
Dependable Products Since 1873
LOCKLAND, CINCINNATI, OHIO

County Highway Work In Jones County, Iowa

(*Continued from page* 11)

of the oil truck so that there is a minimum of effort required to unload drums when they are delivered to storage and also to roll them from the platform onto the truck which carries the oil out to the storage sheds scattered over the county. Blades and grease are stored beneath. During 1941 an addition was made to this shed, providing four additional stalls for storing trucks in bad weather.

In the main storage yard are considerable stocks of lumber, piles and corrugated pipe. A siding serves this yard and makes it possible to deliver diesel and gasoline fuels by carload lots to the 10,000-gallon diesel tank and the 15,000-gallon gasoline tank at the back of the yard. There is also a small storage yard at Onslow and a completely enclosed small yard at Monticello.

The Equipment Owned

The equipment owned and operated by the Jones County Highway Department includes the following:

1 Model L Allis-Chalmers tractor
1 Model WS Allis-Chalmers tractor
3 Model 35 Allis-Chalmers tractors
1 Model 75 Allis-Chalmers tractor
2 Caterpillar RD6 tractors
1 Caterpillar RD4 tractor
4 Allis-Chalmers No. 42 patrols
1 Caterpillar No. 11 power grader
1 Caterpillar No. 12 power grader
2 Adams 50 power graders
2 J. I. Case Model LI tractors
1 International tractor
1 J. I. Case mower
1 Dragline
1 Chevrolet delivery truck
1 Plymouth sedan
1 Chevrolet sedan
2 Chevrolet pick-up trucks
1 4½-ton FWD truck with trailer for moving tractors and dragline
2 International 1½-ton dump trucks
1 Chevrolet 1½-ton truck
2 Ford 1½-ton trucks
1 Iowa 9 x 36 jaw crusher
1 Iowa 15 x 36 jaw crusher
1 Schramm air compressor
1 Universal jaw crusher
1 Rock drill
8 V-type snow plows
2 Adams 12-foot graders
6 Hawkeye patrol graders
1 Adams patrol grader
2 Caterpillar patrol graders
1 Austin-Western 10-foot grader
2 Adams 10-foot graders
2 Caterpillar 10-foot graders
1 Austin-Western 9-foot grader
1 Caterpillar 8-foot grader
1 Caterpillar 10-foot grader
2 Rooter plows
10 Rotary fresnos
1 3½-yard scoop
1 Gar Wood 6-yard scraper

In addition the county owns about 40,000 feet of snow fence.

Organization

There are five County Supervisors elected at large at the biennial elections for terms of three years. The Board of Supervisors appoints the County Highway Engineer for a term of one year. Charles A. Speathe, the present County Engineer, was Assistant County Engineer from April 15, 1926, to Sept. 1, 1936, and has been County Engineer from that time to date.

The county is so organized that all bridge work is done on "schedule" which means that it is done by contract according to certain definite agreed charges for certain operations. A crew is maintained for culvert work only and another crew for clearing and grubbing.

Flashlight Batteries

The Ideal Quirk Rechargeable storage battery of the wet cell type is designed for heavy-duty service in flashlights used by maintenance men, night crews, on tunnel jobs and for emergency service which requires a steady powerful light which may be used continuously for hours. Precision built and of rugged construction, this flashlight battery is weather and moisture-proof, requires a minimum of care, and is unconditionally guaranteed against defects in workmanship and material for a period of six months.

The feature of these batteries is that they are easily rechargeable, as they are built on the same principle as an automotive storage battery. They thus assure a continuous uniform bright light, and it is stated that the savings effected soon pays for the battery and charging equipment.

Copies of Catalog No. 44 describing the features of these flashlight batteries may be secured by those interested direct from the Ideal Commutator Dresser Co., 1366 Park Ave., Sycamore, Ill., by mentioning this item.

New Curing Covers For Concrete Roads

Centraline Road Coats for use in curing concrete pavements are made of a tough waterproof Kraft combined with burlap and paper backing, serving to seal in the water and eliminating constant sprinkling. These Road Coats are available in any size for any job, with a standard width of 23 feet and a standard length of 24 feet.

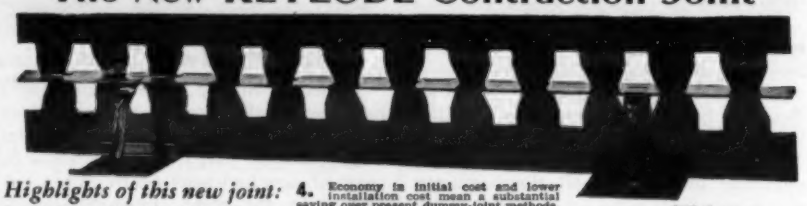
Users have reported that two men can easily apply these covers and that they are still in good condition after a number of uses. They can be rolled or folded for quick convenient handling or storing until the next job.

Complete information on Centraline Road Coats may be secured by interested contractors and engineers direct from the Michigan-United Waterproof Division, Central Paper Co., Muskegon, Mich., by mentioning this magazine.

Lincoln Branch Opened In Jacksonville, Fla.

The Lincoln Electric Co., Cleveland, Ohio, manufacturer of arc welding equipment, recently opened a new office in Jacksonville, Fla. J. M. Chapple, who until recently was with the Detroit Office and prior to that Managing Director of Lincoln's Australian Branch at Alexandria, will be in charge.

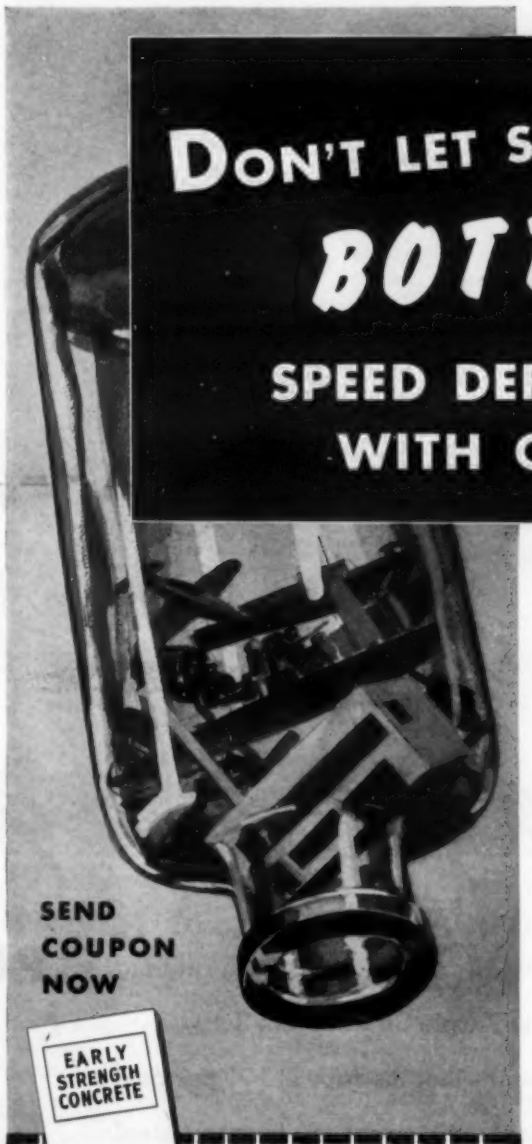
The New KEYLODE Contraction Joint



Highlights of this new joint:

1. A rigid, fully assembled unit for transverse contraction joints, ready to be spiked to subgrade. (No dowel bars required.)
2. The heavy plate shoes with arm braces insure uniform installation alignment of dowel plate.
3. The concrete slab edges are interlocked above and below the 12-gauge key-plate to transfer heavy traffic loads.
4. Economy in initial cost and lower installation cost mean a substantial saving over present dummy-joint methods.
5. The KEYLODE contraction joint, with 12-gauge plate dowel, also acts as a seal, and with the 30-gauge dividing plate held ¾" below top of slab, eliminates the necessity of edging and filling top of joint.
6. KEYLODE contraction joints are furnished crowned or straight, as may be specified, and are shipped painted and greased. (To break bond.)

Write
HIGHWAY STEEL PRODUCTS COMPANY
Chicago Heights, Ill.



Planes, tanks and *guns* don't roll off assembly lines until buildings are built to house machines and workers. The construction which precedes manufacture of defense materials brooks no delay waiting for concrete to harden.

The chemical actions which give concrete strength, slow up progressively as the thermometer goes down—becoming dormant around 20° F.

Yet test cylinders show that the same concrete which doesn't set in a month at 20° temperatures will, if calcium chloride is used, acquire 1000 lbs. compressive strength in a week even if exposed continuously on all sides at 20° F.

Such concrete, with calcium chloride added (when given moderate protection), will take only two days to develop strength adequate for removal of forms or placement of additional courses.

Where work is urgent, strength necessary to proceed with construction may be secured in one day, at moderate cost, if calcium chloride is used with an extra sack of cement added to the mix and the work well protected for 24 hours. Calcium chloride in concrete provides high early strength, real cold weather protection—and shortens by many days the use of forms and the need for protection or heating.

Send for new report presented at the 1941 Highway Research Board Meeting of tests conducted by the National Bureau of Standards on concrete at low temperatures.

NEW BOOK

Send me "Early Strength Concrete," a manual giving results of latest 1941 tests by the National Bureau of Standards on low temperature concreting.

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4145 Penobscot Building • Detroit, Michigan

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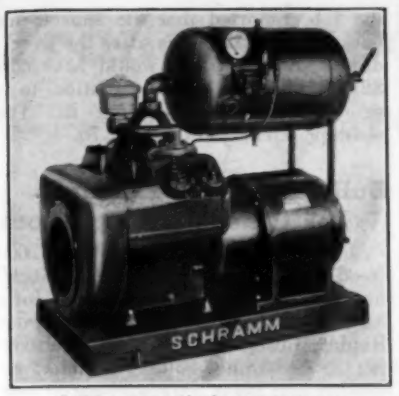
HIGH EARLY STRENGTH
SPEEDS WINTER CONCRETE CONSTRUCTION



A new compact air compressor.

New Light Compressor For Shop, Field Work

The recently announced Schramm Model 50 air compressor is a small compact unit incorporating the design and construction features of the larger Schramm models, including the mechanical intake valve, long-life discharge valves and multi-cylinder construction. This new design has four-cylinder V type construction that does not require a cooling unit or running water, while the cylinder arrangement makes it very compact and serviceable, the manufacturer states.

Built in many different mountings, with either V belt or direct motor drive, the unit has an air receiver base or overhead tank, suitable for pressures up to 200 pounds, and can be operated at full speed or reduced speeds, for minimum or maximum loads, depending upon the requirements of the work at hand. This compressor needs no special platform or supports, but can be bolted to any level foundation.

Further information on the Model 50 compressor, which is suitable for running drills, spraying equipment or pneumatic tools, for riveting, inflating tires and similar service in the field or shop, may be secured by interested contractors and state and county highway engineers direct from Schramm, Inc., West Chester, Penna., by mentioning this item.

New York Engineers Honored by "Moles"

Announcement has been made by The Moles, an organization of men now or formerly engaged in the construction of tunnels, subways, sewers, foundations, and other heavy construction, that their Annual Awards for outstanding achievement in the heavy construction field will go to M. J. Madigan of the engineering firm of Madigan-Hylan and to Edmund A. Prentis of Spencer, White & Prentis, both of New York City. The Awards will be made at a dinner preceding the annual business meeting of The Moles on February 4.

Mr. Madigan, a member of the consulting engineer firm of Madigan-Hylan, who receives the 1942 Moles Achievement Award in recognition of his capacity and forcefulness to conceive, design and accomplish the construction of public works and for his contribution to National Defense, started his construction career with Booth & Flynn and came to New York in 1927 as Chief Engineer for C. H. Earle, Inc., contractor for the first section of the Southern State Parkway, Jones Beach Causeway and other jobs in the Metropolitan area. In 1928 he organized the firm of Madigan-Hylan which since 1934 has been consulting engineers for the Triborough Bridge Authority and the New York Central Railroad. For the past year Madigan has served as Special Advisor to Assistant Secretary of War Robert P. Patterson on defense construction.

Ted Prentis, who was selected for a Moles Award in recognition of his enterprise, courage and resourcefulness, notably in the fields of underpinning, foundations, subways, tunnels, dams, mining and drydocks, has worked extensively in Latin America as well as with contractors in New York and in 1919 organized his present firm of Spencer, White & Prentis. He is co-inventor, with Lazarus White, of the Pretest system of support and co-author of "Modern Underpinning", "Underpinning" and "Cofferdams". Spencer White & Prentis, specialists in foundation and underpinning work, has completed more than 800 foundation contracts, has built five dams and locks on the upper Mississippi and five sections of New York subways. They are now engaged, with other contractors, on the Delaware Aqueduct and on the construction of two drydocks at the Philadelphia Navy Yard and one at Norfolk, Va.

Road Users Paid More Than a Billion in 1940

A total of $1,327,277,000 in direct taxes was collected from highway users by the state treasuries during 1940, an increase of 6 per cent over 1939, according to a recent statement issued by the Public Roads Administration. Of this total, $870,136,000 came from state gasoline taxes, $439,178,000 from motor vehicle fees, and $17,913,000 from motor-carrier taxes.

Disbursements from such funds by the state treasuries during 1940 totaled $1,321,082,000. A total of $754,497,000 was spent on state highways, $323,331,000 for local streets and roads, and $196,579,000 for non-highway purposes, such as relief, education and general state funds, while the cost of collection amounted to $46,693,000. The total for non-highway purposes was 14.9 per cent of the collection.

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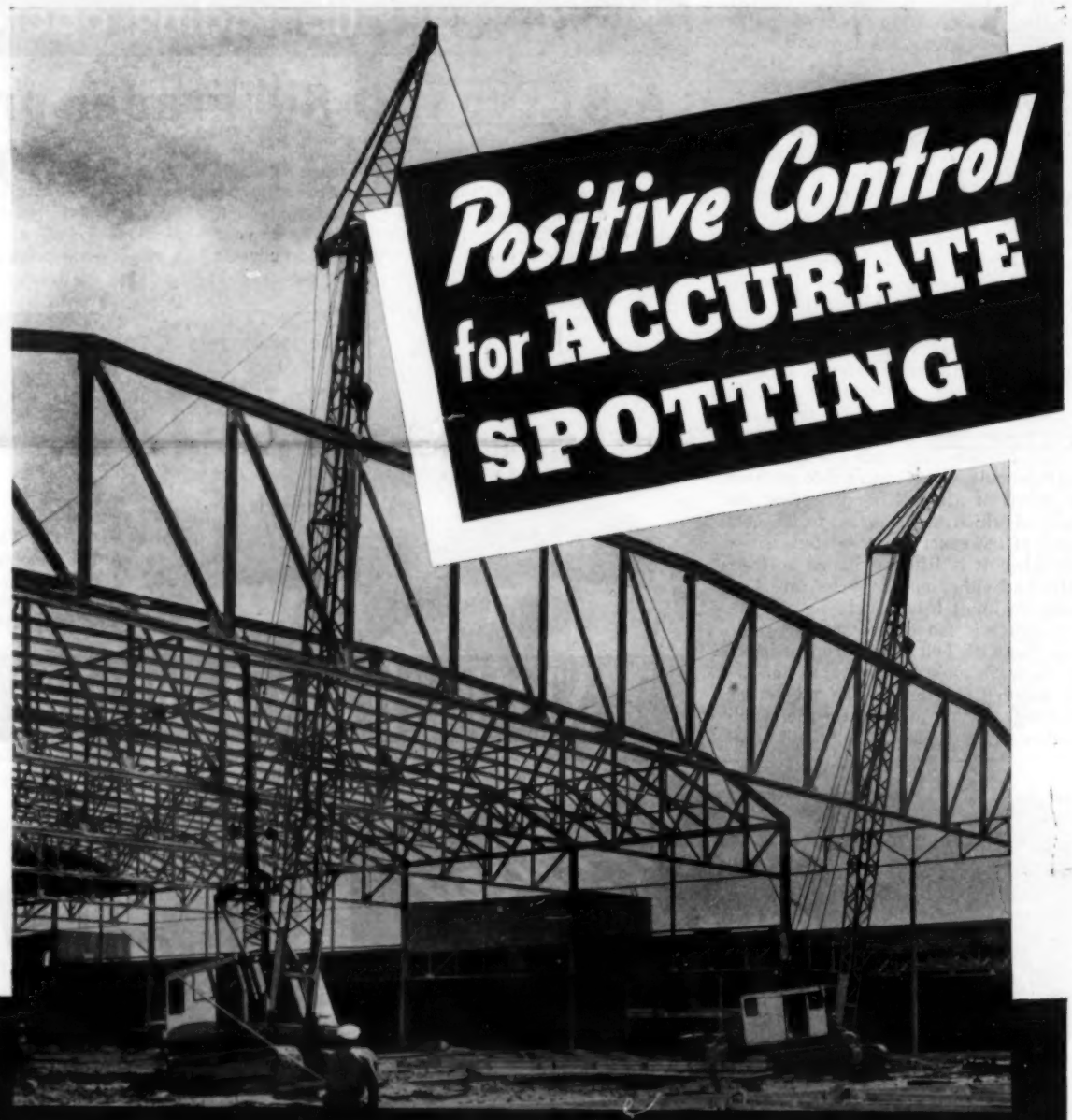
Crestline, O.

Builders of Equipment for more than fifty years.



Independent Boom Control

On this big defense job Koehring Cranes were an important factor in the high speed building construction. Koehring Cranes swing or travel while raising or lowering the boom. This important advantage saves time when handling material, setting steel or forms, spotting concrete buckets. Booms may be lowered by power for safe and positive operation. Adjustable jib boom, power controlled, and collapsible gantry frame, power controlled, are other important time-savers. When high speed, safe operation is necessary, Koehring Cranes have advantages to help speed building construction.

KOEHRING COMPANY
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KOEHRING HEAVY DUTY

HEAVY-DUTY CONSTRUCTION EQUIPMENT

The detachable concrete conveyor used by the United Concrete Pipe Corp. to deliver concrete to the top of the parapet walls along the Los Angeles River levee.

Novel Conveyor for Handling Concrete

In constructing the parapet walls on top of the Los Angeles River levee, a feature of the river-lining contract of the United Concrete Pipe Corp., Los Angeles, Calif., a difficult concrete-handling problem was solved by designing an ingenious detachable conveyor specially for the job.

The mixer trucks which haul the concrete from the batching plant have to come along the top of the levee where there is not enough room to turn around or to pass. As each truck arrives, the belt conveyor is attached to the rear of the truck, directly under the spout, by means of a pivot which slips into a special device on the truck, so designed that the conveyor may be set at any elevation. From the top of the conveyor a steel cable is hooked to the top of the truck frame to give additional support. Only a minute is required to attach or detach it.

The conveyor is powered by a gasoline motor located at the center of its frame. The whole assembly weighs only 1,200 pounds, and is swung into position by means of a small hand derrick, the ropes of which are attached to the conveyor at the exact center of balance so that when it is lifted it hangs horizontally, and either end may be raised or lowered almost by a touch.

Concrete is fed out of the mixer directly onto the belt which drops it in the forms as fast as required. It handles the concrete as fast as the mixer can discharge it, but on the narrow walls it takes about 8 minutes for the 4 cubic yards. The walls are 6 feet high, 6 inches thick at the top, 28 inches at the base, and about 500 linear feet a day of parapet walls are being poured by this method.

Welding Saves Money In Repair of Shovel

Arc welding saved $1,953 for the Utah Construction Co. on the repair of a broken crawler frame of cast steel on a 2½-yard shovel working on the Natahala River Dam being built near Andrews, North Carolina.

The huge casting, weighing over 5 tons, broke just back of the drive sprocket end. First the track was "broken" and the front track idling sprockets disassembled in order to get to the broken frame. Hydraulic jacks were used to raise the frame back into place and align it. Then the frame was tack-welded into position, using a Hobart arc welder. Next the crack was veed out and welded with high-tensile and mild steel electrodes. Then two pieces of high-tensile steel straps ¾ x 6 x 28 inches were welded to the frame in the form of a gusset in order to reinforce and strengthen the frame near the break.

L. E. Ridnour, welding foreman on the job, reported that the shovel was back at work 12 hours after the breakdown. A new frame would have cost $2,000 plus freight, in addition to a probable delay in securing it. The welding repair job cost $47.76.

Bulletin on Big Primary For Crushing Large Rock

A single sheet bulletin entitled "You Need a Big Primary to Crush Big Rock" has recently been issued by the Iowa Mfg. Co., 916 North 16th St., Cedar Rapids, Iowa, describing and illustrating the Cedarapids 25 x 40 portable jaw crusher and heavy-duty steel-apron rock feeder. Two action photographs show this equipment in operation, one with an electric motor for power and the other powered by a diesel engine; important features are described and complete specifications are given.

Copies of this bulletin, No. PP-1, may be obtained by writing direct to the manufacturer and mentioning this item.

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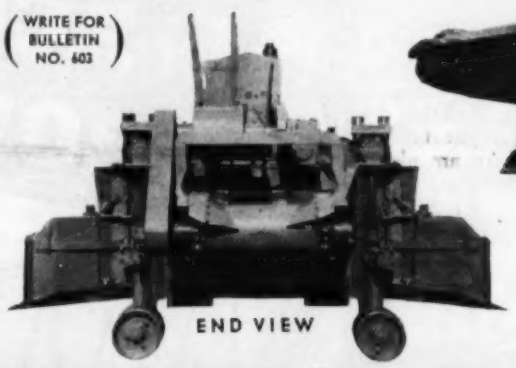
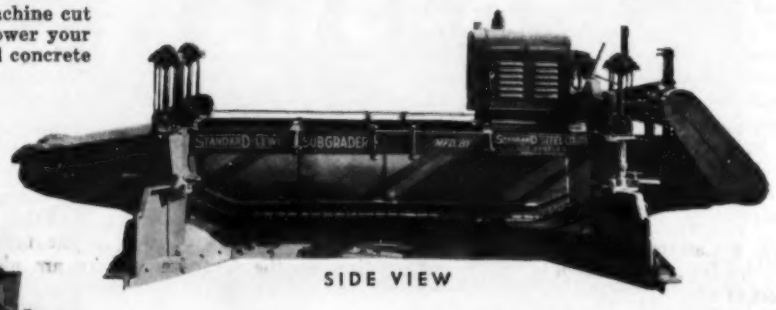
One operator and a helper can prepare subgrade with this machine at the lowest cost ever attained.

Not only does the efficiency of this machine cut down subgrading costs, but it will also lower your costs of rough grading, form setting, and concrete or asphalt placing.

(WRITE FOR BULLETIN NO. 603)



END VIEW



SIDE VIEW

And dollar losses due to voids and improper subgrade will be entirely eliminated.

This machine is building most of the airports in the West.

Detailed records to substantiate this claim are obtainable from contractors using these subgraders. *Write us for further information.*

STANDARD STEEL CORPORATION 5001 So. Boyle Los Angeles

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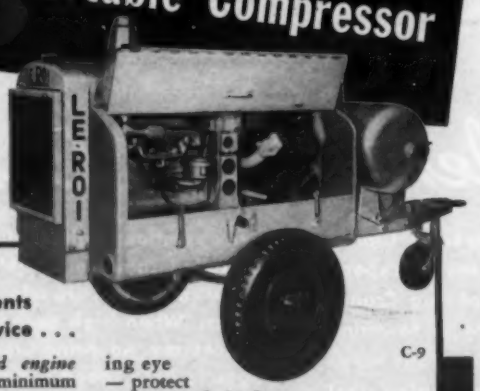

Quickly transported to the job site. Then just touch a button to get air. Built by the *only* manufacturer who makes *both* the engine and compressor. Put it to work for you — to get jobs done easier . . . quicker . . . at lower cost.

Le Roi-engineered to the special requirements of air compressor service . . .

Heavy-duty valve-in-head engine easily accessible — insures minimum lost time, repair costs.

Retractable caster wheel support makes moving on job easy.

Truck-type springs, cushioned towing eye — protect against road shocks.

Many other desirable features.

★ Both sizes, 85 and 105 cu. ft., described in bulletin 22G1. Write for it!

C-9

Other models 60 to 420 c.f.m.

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Above rates subject to 10% increase effective December 1, 1941, in Milwaukee hotels

Trailer Repair Shop Of Grading Outfit

John Dieseth Co. Operates Trailer Camp With Repair And Grease Shops for Large Tractor and Scraper Fleet

(*Photo on page 48*)

✦ THE memorandum we received from those "in the know" said, "Drive south from Duluth on Minnesota 23 and you'll find some real grading." Taking the memo at its face value, we followed directions and ran into John Dieseth Co.'s tractor outfit working full blast on seemingly impossible grades in a wet sticky clay, while the elevating grader and truck outfit was parked at camp. We knew why later when a Farmall tractor pulled us out of a soft spot on the fill at the south end of the job.

The grading is another story which will be told later. Here we want to tell you about the complete repair shop, grease house, office, camp, kitchen and dining room, all on wheels, that John Dieseth showed us with truly justifiable pride.

The Outfit

The job at hand was the moving of 600,000 cubic yards of dirt in 10 weeks, weather permitting. For this work John Dieseth Co. of Fergus Falls, Minn., had seven RD8 tractors, one D7, a TD-14 and a TD-40 with Bucyrus-Erie bulldozers; an Adams power-control elevating grader with a power-driven 48-inch belt; one 12-yard, three 13-yard and one 14-yard LeTourneau Carryall scrapers; one No. 11 and one No. 12 Caterpillar graders; a Caterpillar leaning-wheel pulled grader for sloping ditch bottoms; and a fleet of nine Ford cab-over-engine trucks, but without the cabs as they are easier to work under an elevating grader without this obstruction. A Farmall Model M tractor was used to pull a Bros sheepsfoot tamping roller.

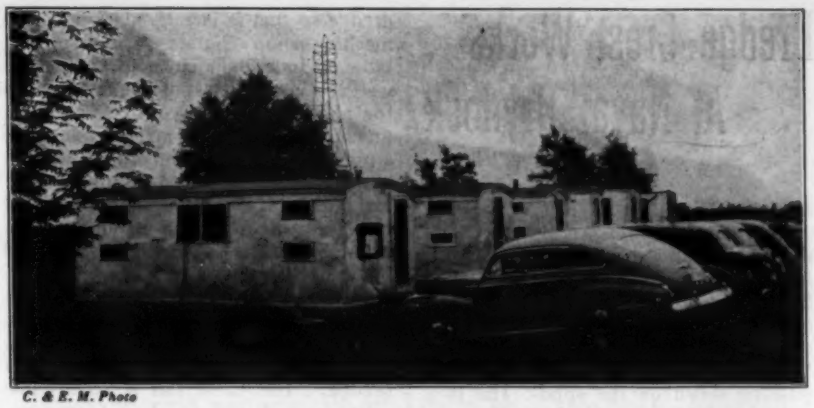
To operate this outfit Dieseth had a payroll ranging between 80 and 90 men, nearly two-thirds of whom were local labor, but the balance were his own outfit, some of whom lived and ate with their families in the "squaw" camp of automobile trailers. A total of about 32 of the outfit ate in the camp dining room.

Repair Shop and Grease House

Dieseth plans to make only minor repairs and adjustments to equipment in the field, as every piece of equipment is overhauled in the winter and early spring before going out onto the first job. In spite of this, the 26 x 10-foot portable repair shop on four wheels proves a very useful piece of equipment. The whole rear of the trailer opens down, providing a ramp for easy access to the inside. In the left corner is a small bench and an anvil, as well as a forge. There is also an acetylene welding outfit in the trailer, with a well-built rack for the various types of welding rods. A hand drill makes possible many of those repairs which are necessary in the field, and close by are several tiers of bins for small parts. At the front of the trailer in a separate section are bins for the storage of larger parts and heavy materials.

A duplicate of this trailer, also on rubber tires, is used for a grease house, where grease and oil are stored and an oil-burner is provided to keep the temperature high enough so that the lubricant may be used easily in the coldest weather. At the front of this trailer is an Onan 1,000-watt light plant from which an underground cable is laid from this trailer to the office and the various sleeping trailers and, on this job, under the road to the kitchen and dining hall. The grease house also contains a Curtis garage compressor with an extra air receiver because the ordinary-size receiver on which the compressor is mounted is not large enough to take care of pumping up the big pneumatic tires on the scrapers. There are also racks for hand tools such as stone forks, adzes, picks, shovels, etc., and in the rear compartment are the oil drums with storage bins below them for large parts. This trailer is equipped with steps at the rear instead of the ramp used on the repair trailer.

As accessories to the repair shop out in the field are a two-wheel P & H-Hansen electric welder from which a tap is taken off to run the Sioux electric drill. A heavy frame near the repair shop is used for lifting heavy parts from equipment or for loading onto trucks to take them to shops in town.



C. & E. M. Photo

John Dieseth Co.'s trailer camp and grease and repair shops to take care of its tractor and scraper fleet.

The Camp

The trailer camp, aside from the repair and grease shops mentioned, includes an office, five trailers for sleeping quarters, a kitchen trailer and the dining trailer which seats 27 men, first come first served, as about 32 eat here. The dinner gong is an old grader plow that had seen far better days, first in cutting its swath cross country, then as the gong on an elevating grader, and now to sound the call for eats.

Want information? Write the Editor.

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FEED GRINDERS
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THESE ARE BUT A FEW OF THE WIDE RANGE OF APPLICATIONS OF BRIGGS & STRATTON MOTORS
Service Men—
Report That Briggs & Stratton Motors Deliver Unprecedented Performance Under All Conditions
Service men who really know what happens to power equipment "on the job" report that Briggs & Stratton motors are "tops" in motor performance. They have proven themselves unusually economical under all operating conditions—perform year after year with little or no maintenance expense—are enthusiastically endorsed by owners and users alike. This is another reason why Briggs & Stratton air-cooled motors are the choice of hundreds of manufacturers of machines, tools and appliances using gasoline power from 2/3 to 6 H.P.
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YOU CAN BANK ON A BROWNHOIST BUCKET

Industrial Brownhoist buckets represent the last word in good design and construction. Light weight is combined with unusual strength. Rope wear is reduced to a minimum. Because of the clean, deep bites they take, hand shoveling is practically eliminated. Standard buckets on hand ready for immediate delivery. Write for further facts.

INDUSTRIAL BROWNHOIST

BAY CITY, MICHIGAN • DISTRICT OFFICES: NEW YORK, PHILADELPHIA, CLEVELAND, CHICAGO

Dredge Crest Works At Naval Drydock

(*Continued from page 1*)

operating three shifts.

The hoisting cables are 2⅜ inches in diameter; and each of the twin cables is 305 feet long. The twin spud cables are 2-inch diameter, there being four cables on each spud. The pair of "pick up" cables raises the spuds while the pair of "pin-up" cables raises the dredge by pushing down on the spuds. The twin swinging cables are 1½-inch diameter, as are also the backing cables which pull the dipper back "under foot" beneath the dredge so as to keep the grade on the excavation.

Power and Equipment

On the main deck of the Crest forward is located the motor for the thrust machinery for the handle, and the Bucyrus-Erie swinging engine for the boom. Aft are located the switchboards and relays, a pair of Sharples oil filters with an oil cooler, and a steam boiler for heating the dredge in cold weather.

Below the main deck are located most of the auxiliaries as well as the main power plant for the dredge. Aft of the central part of the dredge, where the main power plant is located, is the stern spud hoist, a cooling pump to cool the fresh water for the engine radiators with sea water, two cooling-water pumps for circulating the water to the engines, and one of these is a spare, a 2-stage 6-inch fire pump, the lubricating-oil pumps, one sanitary pump, one culinary pump, and a 120-hp Fairbanks-Morse standby diesel engine direct-connected with two 120-volt General Electric generators. Throughout the dredge, all oil pipes are painted red and water lines are painted green.

In the central section of the dredge are the two 720-hp Fairbanks-Morse diesel engines with General Electric generators. These two diesel engines are the first full diesel engines built by this company in the United States. A gravity fuel-oil feed line supplies the two engines. Between these two main engines is another smaller Fairbanks-Morse diesel engine with a generator to supply the electricity needed for the dredge when the main power plant is not operating. The three generators mounted on the same shaft with the starboard diesel engine drive the hoist, the swing and the farthest generator from the engine furnishes power for auxiliary equipment. The three generators on the shaft with the port engine supply current to the hoist, thrust and auxiliaries. All of these generators are direct current at 250 volts. There are two small compressors to supply air for starting the diesel engines, and one larger compressor which supplies air for the pneumatic controls at the operating platform on the top deck. There are six storage tanks for the starting air which are maintained at 250 pounds pressure.

At the forward end of the dredge below the main deck are located the hoisting machinery, backing machinery, the spud hoist motors, the fuel oil transfer pump, and bilge pumps. Forward on the port side is a complete electric repair bench and a lubricating-gun stand, as well as an electric heater for the Texaco Crater compound used for lubricating the cables. A complete battery of cylinders of the Lux System is maintained forward for fighting fires below decks.

On the main deck, amidships, are the deck winches on either side for moving the scows; and at each end of the dredge is a kedge anchor and hoist for anchoring the dredge when not in operation. Each anchor weighs 3 tons.

A complete machine shop is maintained aboard, capable of making practically all necessary repairs on the dredge so that it is self-sufficient. The machine shop contains a drill press, lathe, grinder, shaper, and riveter, as well as a complete set of pneumatic tools for maintenance and construction. Further in this main-deck machine shop are a power hack saw, a Lincoln arc welder, and spare armatures stored under cover for replacements. Yale chain blocks of various sizes are kept on hand for maintenance; and a 10-ton hand-operated Brownhoist crane running longitudinally above the main deck is available for removing large units of the power plant. On the wall of the main deck is a stretcher available for immediate service if needed. The Crest has a remarkable safety record and freedom from accidents.

The dipper digging motors are constant speed units, so that a differential hoist drum is necessary to give the variation in speeds required for economical operation. The hoist drum is of small diameter where the cable first winds up, to provide maximum power for digging, then the cable climbs up from an approximately 5-foot diameter drum to a 10-foot diameter hoist for lifting. The lowering speed for the dipper is much faster than the raising speed.

Operation of the Dredge

The dredge requires two men for operation: one on the operating platform at the top of the dredge, who handles hoisting, raising the dipper, and swinging, while a crane man in a cab below lowers the dipper to the prescribed depth, making allowance for the tide. The swinging circle on the Crest is 26 feet in diameter. The operator has four levers: the first controls hoisting and lowering in its two extreme positions, and while at neutral acts as a brake; the second lever is for swinging; the third controls the hoist for the backing cable; and the fourth handles the two forward spud hoists. The stern spud hoist is operated by the Deck Mate. There is a powerful searchlight at the forward end of the dredge even with the operating platform on each side, and another below the crane man's cab. These greatly increase the efficiency of night operation.

Excavating the Drydock

The top 10 feet of excavation for the Bayonne drydock was removed with power shovels, and then the dredge Majestic of the Great Lakes Dredge & Dock Co. was brought in in March, 1941, and excavated to from 25 to 28 feet of water, following which the Crest started its deep excavation. The Crest traversed the entire area four times, working first to a depth of 50 feet in 50-foot swings, repeated for the entire width of the drydock, then excavating to a depth of 60 feet in strips 40 feet wide, and then successively 65 and 67.5 feet deep in strips 35 feet wide. The maximum excavation was 73 feet for the pump sump for draining the drydock when in use. At depths from 40 to 45 feet, the Crest averaged 342,000 yards per month; while in deep digging, 7,000 yards was a very good 24-hour day's work.

The tender, M. G. Hausler, Jr., was used to move the five scows which carried the excavated material to the dump; and then the R. P. Clark, a 20-inch hydraulic dredge, rented by the Navy from the Arundel Corp. of Baltimore, Md., picked up the material from the dump and delivered it for fill at a maximum distance of 3,000 feet. Two of the 150-cubic yard scows are of all-welded construction 230 feet long, 44 feet wide, and 15.5 feet side depth. Each scow has a draft of 4.5 feet when light at sea, and a draft of 14 feet at the bow and 14.5 feet at the stern when being towed with a full load. The operator of the Crest moved the scow from its mooring at the stern alongside and forward as the pockets were filled, so that an empty pocket was brought beneath the dumping position of the dipper.

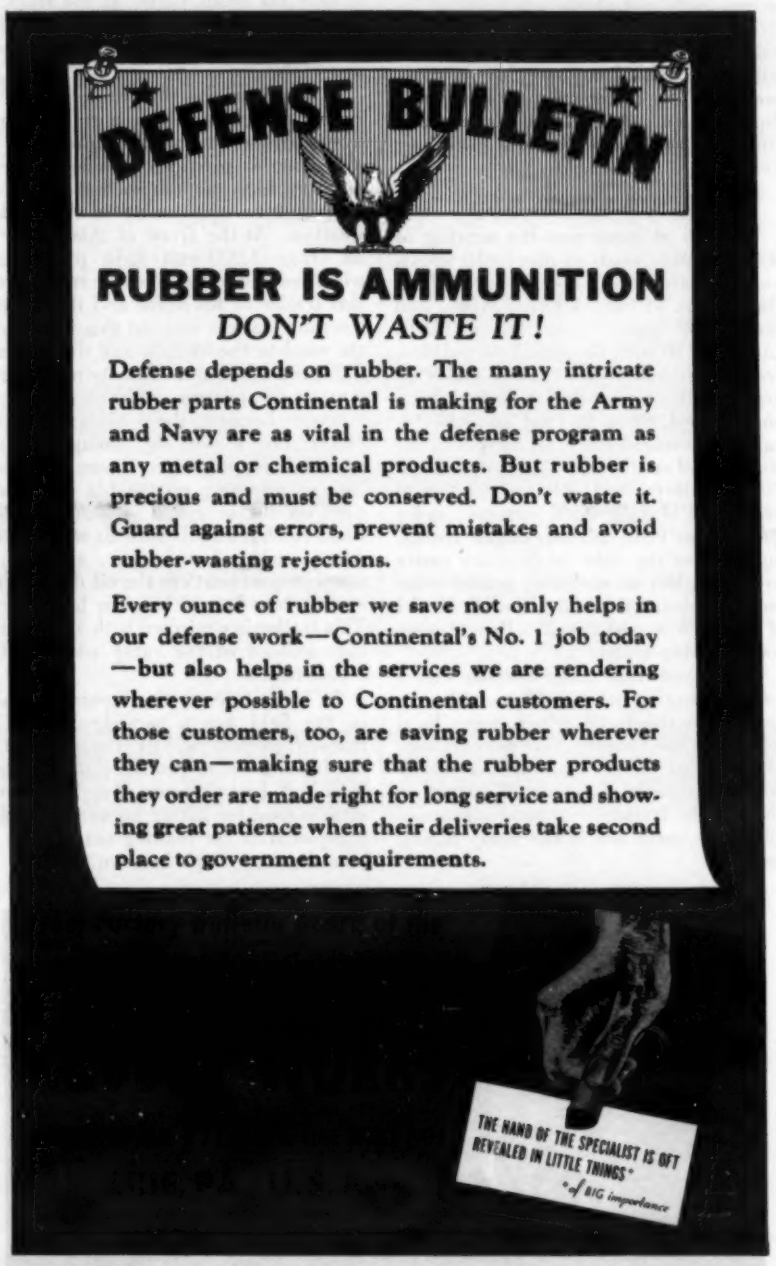
The final clean-up of the drydock area before tremie concreting started was done by the 20-inch hydraulic dredge, R. P. Clark, of the Arundel Corp., using an extended perpendicular pipe on the end of the suction pipe with the cutter removed. By this means, all silt on the bottom and all washed-out fines from the coarser material was readily removed.

Personnel

The Naval Drydock at Bayonne, N. J., is being constructed under the direction of the Bureau of Yards and Docks, U. S. Navy, of which Rear Admiral Benjamin Moreell, C.E.C., U.S.N., is Chief, with Commander A. D. Alexis, C.E.C., U.S.N., as Officer in Charge of Construction. For Bayonne Associates, Inc., Herbert M. Hale is Manager, and Captain L. E. Bouchard is Master of the dredge Crest.

Daniel Joins LaPlant-Choate

According to an announcement received recently from the LaPlant-Choate Mfg. Co., Inc., 2830 First Ave., Cedar Rapids, Iowa, C. M. Daniel has joined its Sales Department. Mr. Daniel was formerly Sales Promotion Manager for the International Harvester Co. at its Terre Haute, Indiana, branch.


DEFENSE BULLETIN
RUBBER IS AMMUNITION
DON'T WASTE IT!
Defense depends on rubber. The many intricate rubber parts Continental is making for the Army and Navy are as vital in the defense program as any metal or chemical products. But rubber is precious and must be conserved. Don't waste it. Guard against errors, prevent mistakes and avoid rubber-wasting rejections.
Every ounce of rubber we save not only helps in our defense work—Continental's No. 1 job today—but also helps in the services we are rendering wherever possible to Continental customers. For those customers, too, are saving rubber wherever they can—making sure that the rubber products they order are made right for long service and showing great patience when their deliveries take second place to government requirements.
THE HAND OF THE SPECIALIST IS OFT REVEALED IN LITTLE THINGS
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OWENS 'Dig In' FOR DEFENSE
A MOUTHFUL AT EVERY BITE
The OWEN BUCKET Co.
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Outmoded Highways Brought Up-To-Date

Connecticut Has Four Low-Cost Methods of Modernizing Old Roads; Comparison Made

By H. C. CARSTEN, Assistant Director of Roadway Maintenance, Connecticut State Highway Department

✦ THE modernization of outmoded highways with a low traffic density by means of constructive maintenance rather than by complete reconstruction is gaining prominence, chiefly from an economical standpoint. With the alignment requirements of an old road reasonable to the volume of traffic, constructive maintenance makes use of the undisturbed well-compacted old road metal to serve as a base. In a complete reconstruction, the possibilities of an undisturbed compacted old road to serve as a base are more or less discarded, but with the old road serving as a base, a lighter wearing course may be used and still provide the required strength.

Connecticut Experiments

Several methods and materials have been tried in Connecticut with varied results. Experimental work of the past year or two indicate that no one method should be established as a standard, but rather that traffic density and type of suitable materials close to the work should be the chief factors in determining the particular materials and method to be used. Naturally, roads with a very low traffic density, not requiring great strength, may be corrected and surfaced with a more economical treatment than roads with a heavier amount of traffic.

Four of the most successful methods tried in Connecticut were: 1. gravel base course with bituminous gravel top course; 2. bituminous gravel base course with bituminous gravel top course; 3. mixed-in-place bituminous trap-rock base course with mixed-in-place bituminous trap-rock top course; 4. plant-mixed bituminous trap-rock base course with plant-mixed bituminous trap-rock top course.

In each method a rough survey of the old road was carried out to determine the corrections needed and the quantities of materials required for the work.

Gravel Base and Black Top

In the first method, the gravel base course with bituminous gravel top course, the modernization of cross section grades, superelevation of curves, correction of pavement sags and irregularities were attained largely with the base course work. The aggregate used was a good grade of bank-run gravel with gradations to provide a stable compaction under rolling. The gravel was placed in a wedge course, thick at the sides and feathering to the center line. A Burch box spreader was used efficiently to place the gravel in the wedge course by raising the gate on the outside end of the box to the required grade. When the gravel was in place and to a grade allowing for compaction, it was thoroughly rolled longitudinally over the road, beginning at the sides and working toward the center, with a 6 to 8-ton roller.

When the rolling was completed, a prime coat of 5 to 8-viscosity tar was applied at the rate of ½ gallon per square yard in preparation for the top course. The top course material was prepared in advance by shovel-mixing blended specification aggregate with tar binder at the rate of 20 gallons per cubic yard. Two types of tar binder were experimented with and both apparently gave good results. However, tar binder No. 1, a blend of one-third RT-2 and two-thirds RT-9, mixed more readily with the aggregate.

Following are typical analyses of the binders and the aggregate:

BLENDED TAR No. 1

Water, per cent by weight		Trace
Specific gravity 25°C./25°C.		1.172
Float Test at 32°C.		50.4"
Specific Viscosity (Engler) 50cc at 40° C.		
Softening Point of Residue		
0-300°C. (R&B)		38.3°C.
300-355°C.		68.5°C.
Specific Gravity of Distillate 38°C./39°C.		
0-300°C.		1.0 1
300-355°C.		1.097
Total Bitumen Soluble in CS_2		93.81%
Sulfonation Residue	0-300°C.	3.5
	300-355°C.	0.5
Sulfonation Factor	0-300°C.	.64
	300-355°C.	.08
Distillation—	0-170°C.	.6
	0-200°C.	1.5
	0-235°C.	4.5
	0-270°C.	9.7
	0-300°C.	18.0
	0-355°C.	33.8
Weight per gal. at 60°F.		9.80 lbs.

BLENDED TAR No. 2

Water, per cent by weight		Trace
Specific gravity 25°C./25°C.		1.1637
Float Test at 32°C.		——
Specific Viscosity (Engler) 50cc at 50°C.		65.8
Softening Point of Residue		
0-300°C. (R&B)		39.0°C.
300-355° C.		70.0°C.
Specific Gravity of Distillate 38°C./38°C.		
0-300°C.		1.010
300-355°C.		1.070
Total Bitumen Soluble in CS_2		94.47%
Sulfonation Residue	0-300°C.	7.5
	300-355°C.	4.0
Sulfonation Factor	0-300°C.	1.3
	300-355°C.	0.7
Distillation—	0-170°C.	Trace
	0-200°C.	—
	0-235°C.	4.4
	0-270°C.	11.4
	0-300°C.	17.4
	0-355°C.	35.1
Weight per gal. at 60°F.		9.69 lbs.

TYPICAL ANALYSIS OF AGGREGATE

Pass 200	3.6 per cent
100	5.6 per cent
80	6.9 per cent
50	13.0 per cent
40	20.9 per cent
10	58.4 per cent
4	75.0 per cent
¾	100.0 per cent

The top-course material was spread uniformly in depth over one-half the width of the road at a time. When rolled to compaction, the depth of the top course was from 1½ to 2 inches. In spreading this material, both the Burch box spreader and a mechanical spreader were used. The box spreader proved more economical but a smoother surface resulted from the use of the mechanical spreader.

(*Continued on page 42*)

Remote Control, especially valuable on construction jobs, eliminates usual delays and actually speeds up work. Preserves weld quality, too. With Hobart Gasoline Drive Portable Arc Welders you can weld continuously without fear of overheating or blowouts. Easy to control, operates efficiently anywhere. Banishes costly delays by repairing equipment right on the job. Write for details.

New, concise and easy to understand WELDING MANUAL. Just off the press. 316 pages, hundreds of illustrations. Send check now for this valuable book or have us send COD. Postpaid only $2

Hobart Bros. Box CE 12 Troy, Ohio
"One of the World's Largest Builders of Arc Welders"

—almost any tractor operator will tell you that. Smooth, single lever, fatigueless control is the answer. Direct blade lift plus greatest down pressure, exclusive to Baker hydraulic operation, guarantees positive blade control—a smoother grade—a faster cut—a bigger load handled.

On any job, clearing, land leveling, stripping, backfilling or grading, Baker Hydraulic Bulldozers and Grade-builders are time savers and profit makers. On the toughest going or the smoothest leveling, hydraulic blade control makes the difference.

On defense and housing projects—in fact, every job today—you need faster dirt moving. Bakers will do it for you. Get the facts from your dealer and send for Bulletin 834 that tells the story of Baker superiority.

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BAKER
The Modern Tractor Equipment Line for
EARTH MOVING
LEVELING AND GRADE BUILDING
SNOW REMOVAL
ROAD MAINTENANCE

Economical Retread For County Highway

(*Continued from page* 17)

by a LeRoi engine, and the pugmill of the mixing plant by an International power plant.

Laying the Mix

The roads on which the retread paving has been laid in the past year were all widened 8 inches on each side, using the surface material laid 4 inches deep compacted in a trench. Then the 1 inch of sand-asphalt retread was laid uniformly over the surface of the widened road with a Barber-Greene tamping-finishing-spreader.

The sieve analysis of the Altamaha River sand, the coarse sand comprising about 70 per cent of the mix, is as follows:

Sieve	*Retained*	*Passing*
No. 3	0	100 per cent
No. 4	4.0 per cent	96 per cent
10-mesh	19.6 per cent	76.4 per cent
40-mesh	71.6 per cent	4.8 per cent
80-mesh	4.1 per cent	0.7 per cent
200-mesh	0.6 per cent	0.1 per cent

The gradation of the sand-asphalt retread, as well as its asphalt content, are as follows:

Total passing No. 4 sieve	96.4 per cent
Total passing 10-mesh sieve	18.1 per cent
Total passing 40-mesh sieve	8.1 per cent
Total passing 80-mesh sieve	0.7 per cent
Bitumen	5.3 per cent

The 1-inch sand-asphalt retread is placed on the old base after a tack coat of 0.15 gallon per square yard of RC3 asphalt has been spread. The pre-mixed material is spread at the rate of 100 pounds per square yard, which gives a full 1 inch of compacted surface.

Other Bituminous Projects

The 1-inch sand-asphalt retread has proved particularly successful on over 25 miles of roads in Glynn County; but it was noted early in the paving program that there was a tendency for the material to shove at turns where most of the vehicular traffic made a right or left-hand turn from the road at a reasonable speed. In order to stabilize the mix and put an end to the shoving, the batches laid at these turns were strengthened with 40 per cent of ¾-inch slag. This completely eliminated all of the shoving as well as the wearing off of the coarsest particles of the coarser Altamaha River sand which worked to the top during the finishing.

A sand-tar mix has been produced at the plant for paving the parking area at the airport and for use as a base for some of the county roads. These bases and the parking-area pavement have been laid as two 2½-inch layers of the local sand mixed with 0.4 gallon of tar per cubic foot of sand. On some of the roads where traffic is very light, the top appears checked, but the cracks go down a depth of only ¼ inch, and after a tar prime of 0.2 gallon per square yard the cracks are reduced to 1/32 or 1/16 inch, and these heal entirely under traffic. As these tar mixes are used only for bases, they are to receive the same 1-inch sand-asphalt top as described above.

In a few sections where the water table on the island is unusually high because of tides, and where the grades must be flat for drainage, the sand below the base tar mix has been stabilized with cinders. On these sections, after the first 2½-inch layer of tar base is complete, it is scarified, the second layer spread by hand over it, and then the two layers mixed together and the top primed with ¼-gallon of tar per square yard.

Personnel

H. J. Friedman, Engineer-Director of Glynn County, Georgia, retains his position as head of the County Highway Department. W. E. Goff is Supervisor in charge of all highway operations; and G. D. Steele is Assistant Supervisor and is in charge of the mixing plant.

The Barber-Greene spreader laid down the thin surface course with unfailing uniformity and smoothness.

Hard-Surfacing Materials And Welding Accessories

The chief product of the Stoody Co., Whittier, Calif., is hard-facing materials for protecting all types of metal equipment from wear and abrasion. Its complete line of hard-facing metals, as well as Stoody electrodes, electrode and bit holders, and grinders, is described in Catalog No. 106 issued by this company.

In these days of scarcity of metals for anything but the war effort, it is extremely important to keep present equipment at maximum efficiency for as long as possible. In many cases this can be achieved by hard-facing those parts which are exposed to severe wear.

Copies of this Stoody catalog No. 106 may be secured by interested contractors and engineers direct from the manufacturer by mentioning this item.

Concrete-Curing Bulletin

"Curing Concrete by the 'Impervious Membrane Method'" is the title of a bulletin recently issued by the Johnson-March Corp., 52 Vanderbilt Ave., New York City, describing its Hunt Process, a bituminous cure, and Ritecure, a transparent cure for concrete. Hunt process, according to the manufacturer, has a marked affinity for unset concrete, adhering to the surface and forming a water-tight and air-tight seal. It dries rapidly and forms a film of uniform texture, free from pin holes. It is easily applied by the use of a single nozzle spray gun immediately after the concrete has been placed and finished, and leaves the concrete a grey kill-glare color. The characteristics of Ritecure are much the same, except that it is a transparent colorless cure and does not stain or discolor.

This bulletin contains information on concrete curing in general and is profusely illustrated. Copies may be obtained by writing direct to the manufacturer and mentioning this item.

Diesels on Defense

This is the title of a new booklet on Caterpillar diesel tractors, depicting these units on all types of defense construction, including ordnance plants, bomber factories, navy buildings, air fields, army camps, munitions plants and other types of vital defense work.

Another new folder "They Wrote a Letter" contains statements from various Caterpillar diesel-tractor owners on the performance of these units, illustrated with job photos and pictures of the owners.

Copies of either or both of these new folders on Caterpillar diesels may be secured by those interested direct from the Caterpillar Tractor Co., Peoria, Ill., or from this magazine.

BUILT TO LAST AND MOVE DIRT FAST

WELDED ROLLED STEEL CONSTRUCTION

Cuts down excess weight, yet assures greater strength at vital points. Rivets used only at sections where quick replacement may ultimately be required. This welded construction, with other important features of Williams design, makes possible broader guarantees of long, profitable service.

Write for individual bulletin covering each type of Williams Bucket.

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"SPRAY MASTER" PRESSURE DISTRIBUTOR

Here's the most modern Pressure Distributor for use in maintaining the modern roads. The Single Valve Control makes it the easiest to operate. One valve starts and stops the spray. Other exclusive features on the "Spray Master" make it the last word in efficiency. "Spray Masters" have proven themselves in action.

LITTLEFORD ROAD BROOMS

Before applying asphalt or tar, Littleford Road Brooms sweep away the dust and dirt, assuring deep penetration of materials. Made in two Models, Power Driven and Traction Driven.

LITTLEFORD

LITTLEFORD BROS., Inc.
485 E. Pearl St.,
Cincinnati, Ohio

A. G. C. CONVENTION
February, 16-18, 1942
at Indianapolis, Ind.

Although Seattle, Wash., had been selected as the place for the 1942 A. G. C. Convention, it was decided after the outbreak of hostilities to hold the meeting at a more central site. Accordingly, the invitation of the Indiana Chapters to meet in that state has been accepted. The Convention sessions will be held at the Claypool Hotel in Indianapolis.

An Interesting Test Of Paint Spray Gun

In order to answer the question "How long will the needle and nozzle of a Milburn paint spray gun remain in operating condition?", the Alexander Milburn Co., 1416-28 W. Baltimore St., Md., conducted an interesting test.

A Type OM gun was equipped with a No. 53 stainless steel nozzle and needle and then attached to an air motor. A counter was applied and over a period of 32 days, the gun was operated 817,081 times. At the conclusion of the run, it is reported that the needle and nozzle were found to be in perfect condition.

Copies of a chart showing the various head and nozzle assemblies for all types of materials sprayed by Milburn siphon and pressure-feed guns, as well as further details on this equipment, may be secured by interested contractors and state and county highway engineers direct from the manufacturer by mentioning this item.

Catalog on Belt Conveyors For Material Handling

Of welded lattice-type construction, Pioneer conveyors are made in standard sections and parts that are readily interchangeable, permitting the erection of units of practically any length which can be operated horizontally, inclined, or up and down. The manufacturer, Pioneer Engineering Works, 1515 Central Ave., Minneapolis, Minn., states that the conveyor is fitted to the job, whether it be for rough heavy-duty service, light work, short installations for truck loading, for a permanent set-up, or where portability is needed.

A new catalog, Form No. 600, recently issued by this company presents facts, figures and photographs of Pioneer conveyors, units and accessories. It also tells about the new KD conveyors which are predesigned and prefabricated steel frame units with all the necessary parts for easy assembly in the field. Those interested may obtain copies of this catalog by writing direct to the manufacturer and mentioning this magazine.

Wire Rope and Its Selection

Five types of Macwhyte preformed and regular-lay strand are described and illustrated in a new folder recently issued by Macwhyte Co., Kenosha, Wis., with information given on the uses for which they are best fitted. Other illustrations show a few Macwhyte wire rope constructions, indicating the wide range of wire ropes available to meet various degrees of flexibility and abrasion resistance in operation, and there is information on how to determine the flexibility of a rope, its abrasion resistance and strength.

Those interested may obtain copies of this folder, entitled "Select the Correct Wire Rope" by writing direct to the manufacturer and mentioning CONTRACTORS AND ENGINEERS MONTHLY.

New Edition of Manual Published by A.I.S.C.

The fourth edition of the Manual of Steel Construction, a handbook for engineers and architects, recently published by the American Institute of Steel Construction, contains considerable new data useful to designers and detailers of steel structures. This additional material consists of tables for cambering of rolled beams; additional values in the section modulus tables that are affected by changes in the 6 x 6 wide-flange section and adding the modulus values for the smallest I-beams and structural sections; five tables of properties for struts; and completely revised standard beam connections for wide flange and American standard beams, including ¾-inch rivets as well as ⅞-inch rivets.

There has been added a table of maximum reactions and minimum spans for allowable uniformly distributed loads on seated connections; tables for additional standard beam connections for ¾-inch rivets to be known as "K" and "KK" series; tables for allowable loads for angle and structural T connections, and a new table giving the net section moduli of plates for gusset connections carrying either ¾-inch, ⅞ or 1-inch rivets.

The welding data have been entirely revised, bringing them up to date and in line with the revisions for the arc and gas welding symbols now being published by the American Welding Society, and there is a new page giving weights of building materials for ceilings, floors, roofs and partitions.

Copies of this Manual may be obtained from the American Institute of Steel Construction, 101 Park Ave., New York City, or from this magazine. Price: $2.00.

McKiernan-Terry Elects New President-Treasurer

At a recent meeting of the Board of the McKiernan-Terry Corp., New York City, Arthur W. Buttenheim tendered his resignation as President of the Corporation and was elected Chairman of the Board, and his brother, Lester H. Buttenheim, was elected to the positions of President and Treasurer.

After 31 years of service, Arthur Buttenheim has been obliged to forego some of his activities in order to devote more of his time to National Defense in which certain of his other interests are now engaged.

The early activity of Lester Buttenheim in the Defense program has necessitated plant extensions which are now being still further increased to care for the volume of work on hand.

★ TUNNELS—Almost every major tunnel job in recent years has been speeded up by Gardner-Denver Automatic Feed Drifters and other equipment.
★ HIGHWAYS—The Pennsylvania Turnpike and many other great highway projects in all parts of the country have been pushed with the aid of Gardner-Denver Portable Compressors, Sinking Drills, etc.
★ CONSTRUCTION PROJECTS—Of all kinds—large and small—are being completed in less time with the help of Gardner-Denver Compressors, Rock Drills, Grout Pumps and other Gardner-Denver machines.
LET "Gardy" Du Much HELP YOU WIN
YOUR RACE AGAINST TIME
Today's rush jobs put a premium on time. On all your contracts, "Gardy" DuMuch—the added factor in Gardner-Denver equipment—will help you win the race against time—keep operating costs low. Write Gardner-Denver Company, Quincy, Illinois.
Gardner-Denver Diesel and gasoline powered Portable Compressors are WATER-COOLED for more economical operation and sustained high air output.
Gardner-Denver "WB" Vertical water-cooled Compressors—small, compact machines having efficiencies comparable to those of larger capacity—and suitable for permanent or semi-portable installation.
Gardner-Denver Drifting Drills incorporate advanced refinement in both automatic feed and hand crank models.
Gardner-Denver Sinking Drills have powerful rotation and strong blowing capacity for faster footage.
Gardner-Denver Air Hoists—powered by 5-cylinder radial air motors for vibrationless operation and uniform torque at all speeds.
Gardner-Denver Grout Pumps—equipped with "Slush-Proof" liners and valves for high-pressure grouting.
GARDNER-DENVER PRODUCTS HELP SPEED VICTORY
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LA CROSSE, WISCONSIN U.S.A.

Avoid Legal Pitfalls

These brief abstracts of court decisions may aid you. Local ordinances or state laws may alter conditions in your community. If in doubt consult your own attorney.

Edited by A. L. H. STREET, Attorney-at-Law.

Liability to Property Owners

Physical injury to private property situated near a construction job is not essential to render the contractor liable in damages to the owner. There are authoritative court decisions which establish the point that if the contractor *needlessly* obstructs the *enjoyment* of abutting premises, or if he obstructs such enjoyment for an *unreasonable length of time*, he thereby invites a lawsuit.

It is both risky and erroneous to assume that merely because there are but two parties to a public construction contract—the public agency and the contractor—private rights may be ignored. It is true that it is common for a contractor to be charged *under his contract* for unjustified delays in completing a job, and uncommon that he be regarded as accountable to private persons for such delays. And, no doubt, most, if not all, courts would say that one who does not suffer an inconvenience not shared by the public in general would have no standing to sue the contractor. But the cases reviewed below show that an abutter who is prejudiced in a *special* way by a contractor's *inexcusable* conduct may hold him accountable in a private suit. On the other hand, it is equally well established that those who own or occupy private property abutting upon a construction site must put up with such disadvantages as *naturally, necessarily* or *reasonably* result from the making of public improvements.

Damage Claims Disallowed

In the leading case on this subject—Farrell v. Rose, 253 New York Reports, 73; 170 North Eastern Reporter, 498—the defendant contracted to build a retaining wall for the City of New York along Harlem River Terrace. Doing the work *necessarily* blocked access to commercial storage garages operated by the plaintiff while the job was in progress, and he sued for compensation for his resulting money loss. The plaintiff stressed the fact that there was a 147-day delay in completing the job, beyond the completion date fixed in the contract. Minor reliance was placed upon the temporary obstruction of access to his garages, without regard to delay in finishing the job.

Finding that the delay resulted from weather conditions, landslides and other conditions not chargeable to the contractors, the New York Court of Appeals set aside a judgment in favor of plaintiff. That tribunal—the highest state court in New York—declared:

"As an adjoining property owner, the plaintiff had the right to use the street and highway in front of his premises, subject at all times to the reasonable control and regulation of the municipal authorities, and to work in the street necessary for its repair and maintenance, or for the construction of other public utilities. This is common knowledge to those of us who live in a metropolis like New York City. The highway is continually being dug up for subways, sewers, gas mains, repairs and the like. *The inconvenience and damage which a property owner suffers from these temporary obstructions are incidents to city life and must be endured.* The law gives him no right to relief, recognizing that he recoups his damage in the benefit which he shares with the general public in the ultimate improvement which is being made. *The law, however, does afford him a relief if the city or a contractor* interferes with the highway *without authority;* or, acting legally, *prolongs the work unnecessarily or unreasonably.* The obstruction of streets and highways, or the work carried on in them of a public nature, must be reasonable and necessary for the public improvement which is being made."

Another Case in Point

A similar result was reached by a lower court of New York in a case where a retail drug company complained of loss of business due to obstruction of access to its store while the defendant was constructing a tunnel through the street. (Linton Pharmacy v. McDonald, 48 New York Miscellaneous Reports, 125; 96 New York Supplement, 675.) The contractor was exonerated by the court on the ground that he had not violated any rule or practice of standard engineering; and that his work was done with all of the care and skill that reasonably could be expected under all of the surrounding circumstances. The court ruled that liability could not be imposed upon the contractor merely because the tunnel could have been constructed without use of the surface structures to which plaintiff objected.

Damage Claims Allowed

Because "circumstances alter cases" there is no conflict between the decision reached by the New York Court of Appeals in the first suit mentioned above and the conclusions reached by the same tribunal in the earlier case of Bates v. Holbrook, 171 New York Reports, 460; 64 North Eastern Reporter, 181. In the Bates case, the suit was successfully maintained against a subway sub-contractor for an injunction and for damages sustained in the operation of a hotel, due to the contractor's maintenance of structures in the street for the storage of tools, generation of compressed air power, etc., for a period that was longer than reasonably necessary. The principal ground of the decision was that the contractor concentrated in front of the hotel temporary structures that should have been dispersed along the entire line of work or at other places. The court said:

"The plaintiff doubtless must suffer the annoyance and injury from such acts as are reasonably necessary to the execution of the work, but it is unjust, and placing upon him an undue burden, to permit the erection and maintenance of this plant in front of his hotel, for the generation of compressed air, to be used along the entire line of the work undertaken by these contractors, from Great Jones Street to Thirty-Second Street, and which may continue for a period of three years or more from its inception. * * * The necessary injuries and annoyances inflicted upon this plaintiff in the proper prosecution of this work arise from the opening of the street in Fourth Avenue, * * * and the construction of the subway, by blasting, and other necessary work, involving obstruction, noise, and general inconvenience. When this portion of the work is accomplished, and the street restored to its normal condition opposite his property, the annoying situation would cease as to him. If, however, the structures of which complaint is made are to be maintained during the entire prosecution of the work on the defendant's section, the plaintiff is subjected to annoyances and injuries that are neither necessary nor reasonable."

Texas Decisions

A warning against using more space in a street or highway for the storage of materials, etc., than is legally permissible will be found in the companion cases of American Construction Co. v. Caswell and American Construction Co. v. Davis, 141 South Western Reporter, 1013, 1019, decided by the Texas Court of Civil Appeals. In those cases it appears that a contractor used more than the one-third part of a street permitted by local ordinance for the storage of materials to be used in constructing an abutting building. In the first case, the court noted that the plaintiffs "had a vested right to conduct their business in their store on said street; and when * * * their business was injured by the wrongful acts of the 'contractors' in obstructing travel on such street, such obstruction became their particular concern, not by reason of the injury inflicted upon the public, but by reason of the particular injury inflicted upon them". And, in the second case, the court recognized that "loss of profits to an established business, occasioned by the unlawful obstruction of a public street, is a special loss peculiar to the party thus injured, even though others similarly situated may suffer a like loss from the same cause".

Do your share in the fight for freedom. Your money is needed for Victory. Buy Defense Bonds and Stamps.

Four-Rear-Wheel-Drive For 1½-to-3-Ton Trucks

A 1½ to 3-ton truck equipped with Thornton four-rear-wheel drive will carry as large a payload as a big truck on smaller tires and using a smaller motor. Its initial cost is lower, the maintenance cost is less and it uses less gas and oil. Also, it is reported, Thornton drive with its spring suspension reduces road shock, its dual-ratio transmission provides a wide performance range and greater maximum rim pull, since it drives smaller tires through two driving axles.

A catalog recently issued by the Thornton Tandem Co., 8701 Grinnell Ave., Detroit, Mich., describes and illustrates the Thornton drive and its applications, and drawings show how easily it can be adapted to a conventional truck chassis. Copies may be obtained by writing direct to the manufacturer and mentioning this item.

Shovel and Dragline Parts Described in New Bulletin

Amsco power shovel and dragline parts are the subject of a bulletin recently issued by the American Manganese Steel Div., The American Brake Shoe & Foundry Co., Chicago Heights, Ill. Made of tough, shock and abrasion-resistant manganese steel, these parts are available for all types of power shovels, cranes, trench hoes, muckers, draglines, and similar equipment, and include such items as dipper stick racks and pinions, crawler idlers, tumblers and rollers, spur gears and pinions, crawler shoes, bucket lips, hitch plates, sockets and several sizes and types of clevises.

Copies of this bulletin, No. 641-S, may be obtained by writing direct to the manufacturer.

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● From every angle—original investment, power cost, maintenance, portability, versatility and performance—this MALL 3 H.P. Concrete Vibrator is your best bet for 1942. It can be wheeled anywhere on the job by one man. It will place more yardage better and faster than can be accomplished by any other method. It can be converted as easily as changing bits in a brace for Concrete Surfacing, Wire Brushing, Sanding, Drilling, Sawing with Chain or Circular Saw, Grinding, Pumping and Sharpening Tools, due to the interchangeable attachment feature. It will start easily in cold weather, runs by itself and operates on 1½ to 2 gallons of gasoline per day. The variable speed, V-belt drive, gasoline engine provides ample power for each application. With hands getting scarce and schedules faster, you'll need this multiple-duty tool more than ever in 1942. Write TODAY for Complete catalog and ask for a FREE Demonstration.

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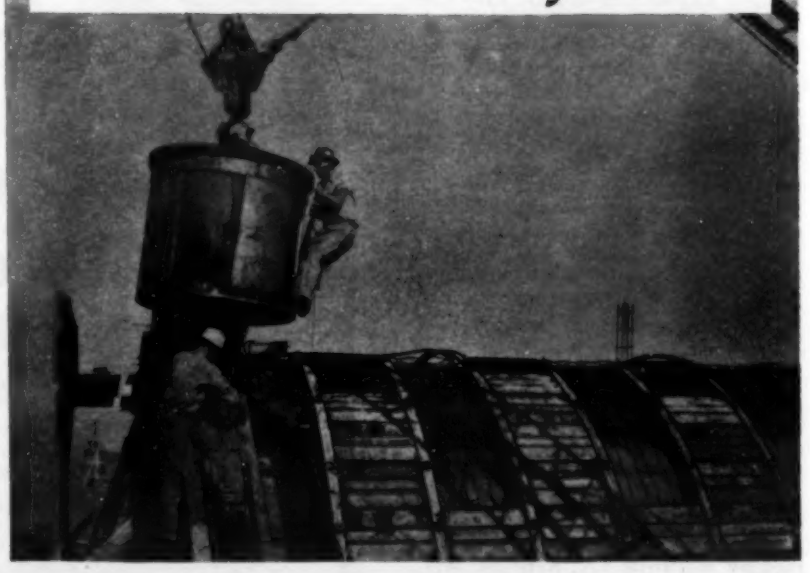
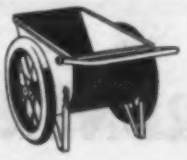


A WORLD'S RECORD of twenty-four completed ammunition storage magazines in 24 hours was recently set by J. A. Terteling and Sons at the Umatilla Ordnance Depot near Hermiston, Oregon. Above is shown how this igloo pouring was done—with *GAR-BRO* equipment! Each *GAR-BRO* product has been scientifically designed with a particular job in mind. Every product will, therefore, do its job the easiest, best and fastest way—the *GAR-BRO* way. For material handling and concrete placing equipment catalogs write Garlinghouse Brothers, 2416 East 16th St., Los Angeles.



GAR-BRO
Construction and Industrial Equipment

Airport-Runway Paving At St. Augustine, Fla.

(*Continued from page 7*)

aid of a 12-foot blade for about one week, or less if the weather continued hot and dry. Every night the area which was being worked was sealed on the top by traffic rolling by a Bros wobble-wheel roller to keep moisture out of the mix.

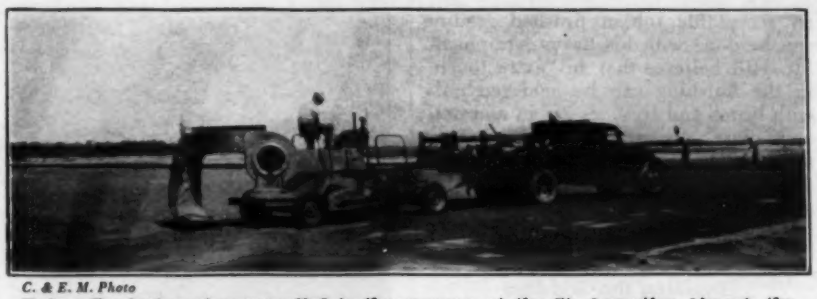
When the spreading was completed with the 12-foot blade, the base was rolled with an 8-ton tandem Buffalo-Springfield roller, and the compaction finished with the Bros roller aided by a special traffic-type roller consisting of a Hug truck with eight tires in the back and dual pneumatics on the front. The last finish blading was a serious cutting of the surface for straight-edging with a 10-foot checking board. Where the runway was widened, the old center line was maintained and the additional 50-foot widening was done all on one side. A crown of 1 per cent was maintained, which made the crown 6 inches on the side away from the widening and 9 inches on the widened side. Where the runway was extended, great care was taken in making the joint between the old and new sections. The old material was cut off vertically with an asphalt trimmer to provide a base for a clean butt joint.

Seal and Tack Coats

The surface of the base was thoroughly cleaned with a Hough rotary broom and blower ahead of sealing the surface with 0.2 gallon per square yard of tar. When this had cured out, the top was given another thorough cleaning with the broom and blower, and a tack coat of RC-2 Mexpet asphalt was applied at the rate of 0.08 to 0.15 gallon per square yard. Both the tar and the asphalt were applied with the contractor's own Etnyre 590-gallon pressure distributor.

Placing the Top

A hot-mix cold-laid top, prepared in Brookville, Fla., and shipped in to St. Augustine by rail, requiring a 3-mile dead haul to the airport, was used for the final surface of all runways. This material was spread with an Adnun Black Top Paver in a 10-foot strip 1 inch thick. The material was rolled immediately behind the spreader with an 8-ton tandem roller, and then sealed with 0.08 to 0.25 gallon per square yard of RC-2 asphalt; and this seal was blotted with hand-cast sand. During the entire period of construction, from the stabilizing through the completion and sealing of the top, the airport was officially closed, but was used in a number of cases of emergency by both private and military planes, the latter from fields both north and south of St. Augustine.



C. & E. M. Photo

Before the tack coat was applied to the runways at the St. Augustine Airport, the surface was cleaned by a Hough rotary broom and blower.

Quantities

The work of improving the airport was started June 23, 1941, and the contractor allowed a total of 75 calendar days for the completion of the original contract plus 180 days for extension. The quantities involved in the original contract were:

Tar base, 6 inches thick	67,000 sq. yds.
Coquina	11,000 cu. yds.
Tar, TSB1, viscosity 12-32 at 140° F. (No item was provided in the original contract for the seal coat of tar, so the required quantity, which averaged 0.19 gal. per square yard over the whole job, was held out from the item of Tar for the base and was used for seal.)	201,000 gals.
RC-2 Asphalt, tack coat	8,100 gals.
Asphaltic concrete surface (using RC-3)	2,500 tons
RC-2 Asphalt for seal	16,100 gals.
Sand for cover	350 cu. yds.

The additional quantities involved in the extension of the runways and in the new NE-SW runway, were:

Lowering 30-inch culvert	38 ft.
Catch basins	4
Concrete culvert pipe, 36-inch	600 ft.
Coquina seepage drain at butt joints	1,400 cu. yds.
Concrete pipe, drainage, 6-inch	4,310 ft.
Ditching	4,500 ft.
Muck excavation	13,285 cu. yds.
Borrow area (not used)	10,000 cu. yds.
Regular excavation, including removal of muck and backfill	75,363 cu. yds.
Clearing and grubbing	33.7 acres
Stabilizing material, coquina	8,539 cu. yds.
Sand-bituminous road-mix, tar base	84,547 sq. yds.
Asphalt, RC1S, @ 4 gals. per sq. yd.	194,438 gals.
Tar, @ 3 gals. per sq. yd.	115,000 gals.
Tack Coat, RC-2 asphalt	12,661 gals.
Asphaltic concrete surfacing	4,227 tons
Cover aggregate, sand	634 cu. yds.
Seal coat, RC-2, asphalt	12,661 gals.

The original bid on which the contract was awarded was $76,254.00. The added work, namely the extension of the contract, involved a total of $244,939.78.

Personnel

The contract for the construction of the runways at the St. Augustine Municipal Airport was awarded to Marion Contracting Co., of Ocala, Fla., for whom Newton Sistrunk was Superintendent. The U. S. Engineer Department, Jacksonville, Fla., District, supervised construction for the Civil Aeronautics Authority. The District personnel in charge comprised Major A. G. Viney, District Engineer; H. H. Williams, Area Engineer; A. D. Brown, Project Engineer; and S. M. Rutherford, Chief Inspector.

"Win Against Winter" Title of New Bulletin

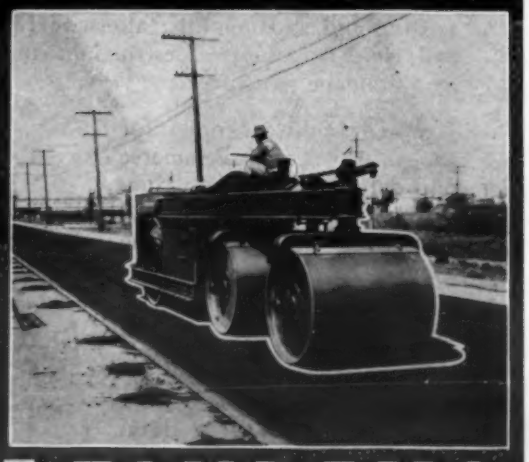
A new 8-page bulletin entitled "Win Against Winter" has recently been published by the LaPlant-Choate Mfg. Co., 2830 First Ave., Cedar Rapids, Iowa, and is devoted to its line of snow plows. The booklet describes in detail the various models of snow plows manufactured for use with Caterpillar diesel tractors and is filled with illustrations showing the equipment at work in the field.

As stated in the beginning of the catalog, today, more than ever before, snow removal equipment must keep roads and highways open. Many of our roads are defense roads which must be kept open if war materials are to continue their ever increasing flow and if we are to be constantly prepared for any emergency.

Copies of this catalog may be obtained by all highway officials and state and county highway engineers direct from LaPlant-Choate by mentioning this item.

MORE TONS PER HOUR

MORE ACCURATELY ROLLED BY

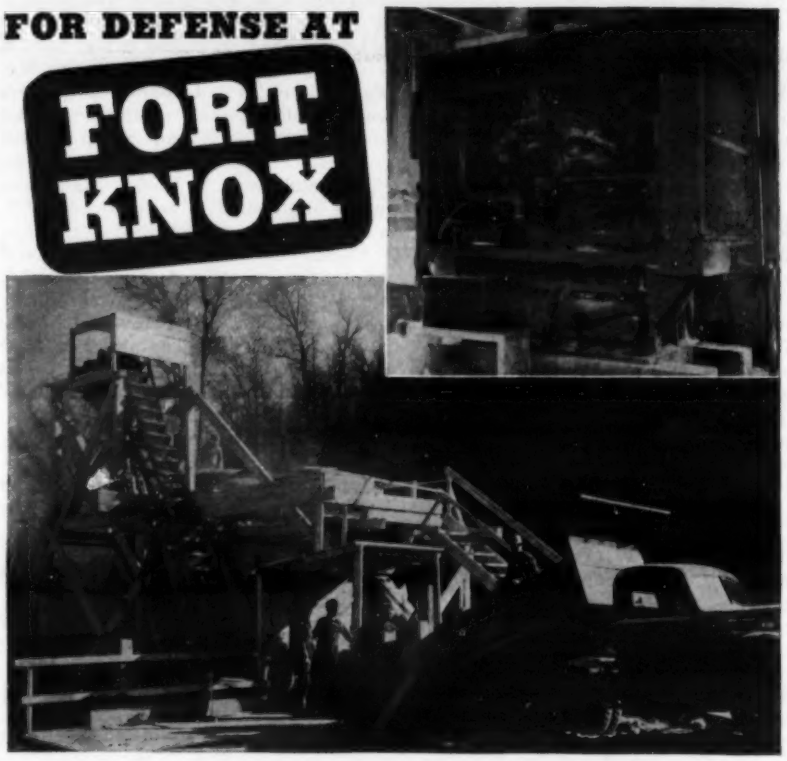


3-AXLE TANDEMS

THE BUFFALO-SPRINGFIELD ROLLER CO.
SPRINGFIELD, OHIO

Roads from Rocks

FOR DEFENSE AT FORT KNOX



● Down at Fort Knox, Ky., contractors Nalli & Mudd of Louisville, Ky. are supplying crushed rock for foundations and roads being built for the U. S. Army. And here you again find Waukesha working for national defense.

Pictures show a Model WKU 4-cyl. 100 hp. gasoline Waukesha Engine driving a 20x36 *Pioneer* rock crusher that's turning out 600 tons of crushed rock per 8-hr. shift. Engine uses 75 gal. of gasoline per 8 hrs. Oil is changed weekly with about ½ gal. added between changes.

All over our vast country contractors and their machinery are bringing into being army cantonments, airports, naval bases and supply depots . . . building the backbone of defense—the nation's highways over which men and munitions must be transported. And the air compressors, shovels, crushers, mixers, pavers, graders—so much of the machinery used in defense construction is powered with Waukesha Engines.

Sizes, 8 hp. to 300 hp.—gasoline or oil fuel. *Get Bulletin 1215.*

WAUKESHA ENGINES

WAUKESHA MOTOR COMPANY · WAUKESHA, WIS.
NEW YORK TULSA LOS ANGELES

Spot sodding on shoulder slopes.

Roadside Sodding On Texas Highway

Excellent Job Done by Gifford Hill on 8.27-Mile Grading Project; Superintendent Praised

✦ THE contract for grading, drainage structures, and sodding on 8.27 miles of new location of U. S. 79 in Rusk County, Texas, awarded to Gifford Hill & Co., included the sodding item in Unit I work to take advantage of the presence of equipment on the grading job and in order to hold the slopes intact as the grading was completed. The work as done is noteworthy for the excellent results achieved in finishing and sodding and direct credit for the quality of the work is given by the Texas Highway Department to E. B. Hill, Construction Superintendent for the contractor, who cooperated closely with the Highway Department Engineers and who takes great pride in a good job well done.

Clearing and Grading

The clearing and grubbing were accomplished in accordance with the specifications, with the trees and shrubs designed to be preserved carefully trimmed and protected from injury during the construction operations.

Rough grading was done with the usual heavy equipment. The finishing, however, was done with teams. Although an acceptable job of finished grading can be done with his heavy equipment, Mr. Hill believes that an "extra touch" in the finishing can be achieved only with teams and fresnoes at "in and out" and close places. He believes, and proves, that no power machinery can do as neat and nice a job of finishing as can teams. It is reported that Hill's finishing is done to the point of polishing.

Handling the Sodding

The sodding was done by hand methods, with a care equal to that of the grading. For the block and strip sodding, shovels, sod cutters, and boards were used. The sod was of excellent material, thick, dense and free of weeds, Mr. Hill securing the best available sod for this work. Since labor is the major expense of sodding, Mr. Hill made a point of selecting good sod which would hold together in large blocks and require a minimum of manipulation to place. Furthermore, since he was to maintain the project until it was accepted, he considered good sod the best insurance against damage by wind and water.

The quality of the sod and the care with which it was placed was attested to by the general appearance of the sodded areas, for within a few days it looked as if it had been there for several seasons. Indeed, before the project was completed, most of the grass had to be mowed as it had grown several inches since it was planted. In the future, little maintenance beyond routine mowing is anticipated to keep the right-of-way in tip-top condition.

Upon completion of the roadway and before final acceptance was requested, Mr. Hill had the project worked over from end to end with a crew of laborers to effect a general clean-up. Particular attention was given to the areas between the backslopes and the right-of-way lines. The clean-up work included clearing out all tangled underbrush, mowing, raking, and picking up of rubbish, all of which was disposed of by burning or burial.

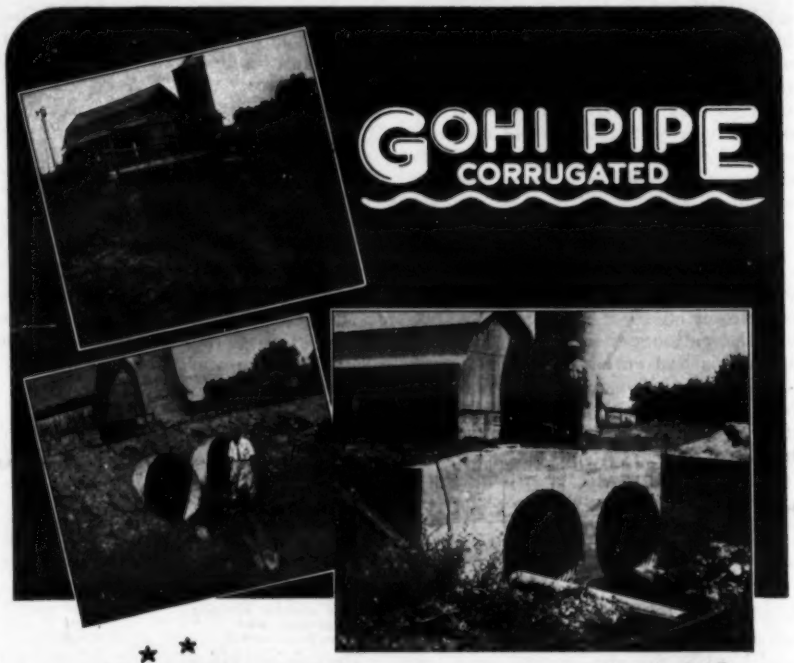
Personnel

The 8.27-mile grading, drainage and sodding contract was awarded to Gifford Hill & Co. of Dallas, Texas, for $190,200.26. Work was begun on January 29 and completed on September 9, 1940. E. B. Hill, Superintendent for the contractor, gave evidence of such unusual cooperation and did such excellent work on this project that he was nominated by the Texas Highway Department for one of CONTRACTORS AND ENGINEERS MONTHLY's Roadside Development Awards for 1940.

For the State Highway Department, the work was done under the supervision of J. N. Robinson, Acting Assistant District Engineer. Jac. L. Gubbels is Head of Roadside Development for the Texas Highway Department.

A general view of Gifford & Hill's roadside development project in Texas, showing the block sodding on steep cuts.

The Southeastern State Highway Officials will hold their winter meeting at the Grove Park Inn, Asheville, N. C., February 12-13, 1942.



Makes every road an open highway for defense!

To install a GOHI Corrugated Pipe under a highway is the work of hours — not of weeks! And when installed GOHI Pipe is "put" for years of continuous, trouble-free service. It successfully withstands the punishment of heavy traffic; resists the destructive action of wear, weather and corrosion; settling and shifting fills; alternate freezing and thawing and, short of complete destruction, continues to do its job as a drainage structure!

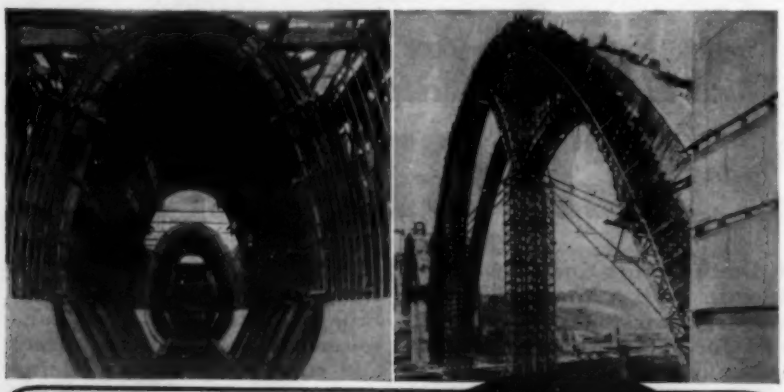
Keeping highways open for the nation's needs in commerce and defense is readily accomplished through the use of GOHI Corrugated Pipe, the longest-lived, low-cost-per-year drainage structure.

Write for FREE copy of 72-page illustrated book on modern drainage practice, containing much wanted data. Address fabricator nearest you.

GOHI
New England Bolt Co. . . Everett, Mass.
Central Culvert Co. . . . Ottumwa, Iowa
Capital City Culvert Co. . . Madison, Wis.
Bancroft & Martin Rolling Mills Co. . S. Portland, Me.
Denver Steel & Iron Works Co. . Denver, Colo.
The Lane Pipe Corporation . Bath, N. Y.
Dixie Culvert Mfg. Co. . . Little Rock, Ark.
St. Paul Corrugating Co. . . . St. Paul, Minn.
The Newport Culvert Co. . . . Newport, Ky.

GOHI Pipe meets Copper-Bearing Pure Iron requirements published by nationally recognized specifying authorities.

GOHI CULVERT MANUFACTURERS, INC.,
NEWPORT, KY.



for Speed in Construction

The rapid progress of engineering construction has naturally influenced the design of Blaw-Knox Steel Forms with respect to their general application and operation.

The engineering facilities and services extended by Blaw-Knox form engineers are prised by all who have taken advantage of them. These services are offered in the interest of engineering progress and are free from any charge or obligation.

BLAW-KNOX STEEL FORMS

BLAW-KNOX DIVISION
of Blaw-Knox Company

The new No. 3½ Smith-Mobile.

New Fast Truck Mixer Of 3½-Yard Capacity

The new No. 3½ Smith-Mobile truck mixer, with ratings of 3½ cubic yards for truck mixing, 4.27 cubic yards for shrink mixing, and 4.58 cubic yards for agitating, recently announced by the T. L. Smith Co., 2857 No. 32nd St., Milwaukee, Wis., replaces the former No. 3 Smith-Mobile introduced to the industry four years ago.

With its larger 165-cubic foot drum volume and sturdy light-weight construction, the new model is said to permit bigger payloads and to be faster in charging, mixing and discharging. Compact streamlined design and the use of Manten steel in important parts has effected substantial weight economies, the manufacturer states. Other features include a new all-geared fully-enclosed transmission; a totally enclosed oil-tight pump drive; a big 36-inch drum opening with self-centering feed chute; a new Sealtite self-cleaning closing door with worm and gear operating unit; a big 160-gallon water tank with larger overflow pipes; and a powerful 42.5-hp engine.

Further information on this new Smith-Mobile may be secured direct from the manufacturer.

New 6-Ton Model Of Mobile Crane

An addition to its line of one-man one-motor-operated pneumatic-tired wheel-mounted Mobilcranes has recently been announced by the Osgood Co., Marion, Ohio. Mobilcranes in 15 and 20-ton capacities are already on the market and the new Model 205WM is of the 6-ton class.

This new Mobilcrane was developed to fulfill the need for a small mobile unit which will travel quickly from job to job, be easy to handle on the road and at work, be operated by one man, and powered by one motor. The Model 205WM has a wide range of speeds for traveling, hydraulic steering, mechanical hydraulic brakes on the rear wheels, and other features for mobility.

The main truck chassis is made of I-beams and diaphragms with welded joints, providing a sturdy base for the upper body. The cast-steel wheels are roller-bearing-mounted, and the front axle is pivoted in the center to provide three-point suspension for the frame. Screw jacks on the rear bumper plate relieve the tires of excessive loads when making heavy lifts, and outriggers are provided for working over the side. A Clark truck-type transmission is provided on the deck, driven by a roller chain and powered through a Lipe clutch. This deck transmission is arranged with four speeds and reverse. Through the speed change gears in this transmission, two additional speeds are available, giving a speed range from 0.86 to 10 miles an hour.

An independent boom hoist may be provided on the machine and is a complete unit mounted in the upper part of the gantry. It is operated by a Twin-Disc clutch, with final drive through bevel gears, and a worm and worm wheel for safety. A brake is also provided.

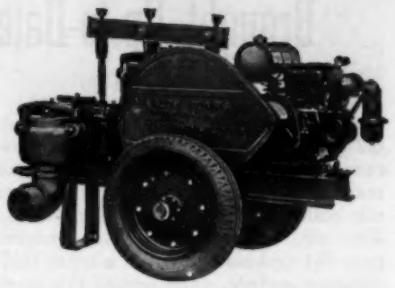
Further information on the Model 205WM Mobilcrane may be secured direct from the manufacturer.

New President Elected For Ohio Distributor

The H. B. Fuller Equipment Co., 1836 Euclid Ave., Cleveland, Ohio, announced recently the election of George S. Crego as President, succeeding the late H. B. Fuller. Mr. Crego has been associated with Mr. Fuller in the sale of equipment for the past six years.

The H. B. Fuller Equipment Co. represents the following companies in northeastern Ohio: Blaw-Knox Co., Link-Belt Speeder Corp., Ransome Concrete Machinery Co., C. H. & E. Mfg. Co., Gardner-Denver Co., Easton Car & Construction Co., Linn Mfg. Corp., Good Roads Machinery Co., and Wire Rope Corp. of America, Inc.

4" Single Mud Hog Pump on Pneumatic Wheels



The "Old Reliable" Mud Hog brought up to date.

Gearing enclosed—running in oil.

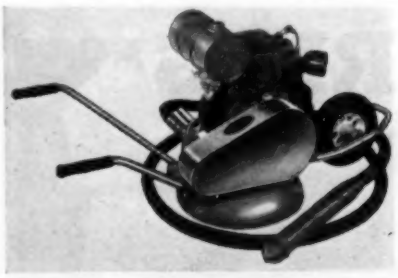
All cut gearing.

Die-forged crankshaft in pump.

Available in the ball valve Force type, or the flat valve Open Discharge.

Send for Bulletin No. CEM-40-D.

MARLOW PUMPS RIDGEWOOD, NEW JERSEY



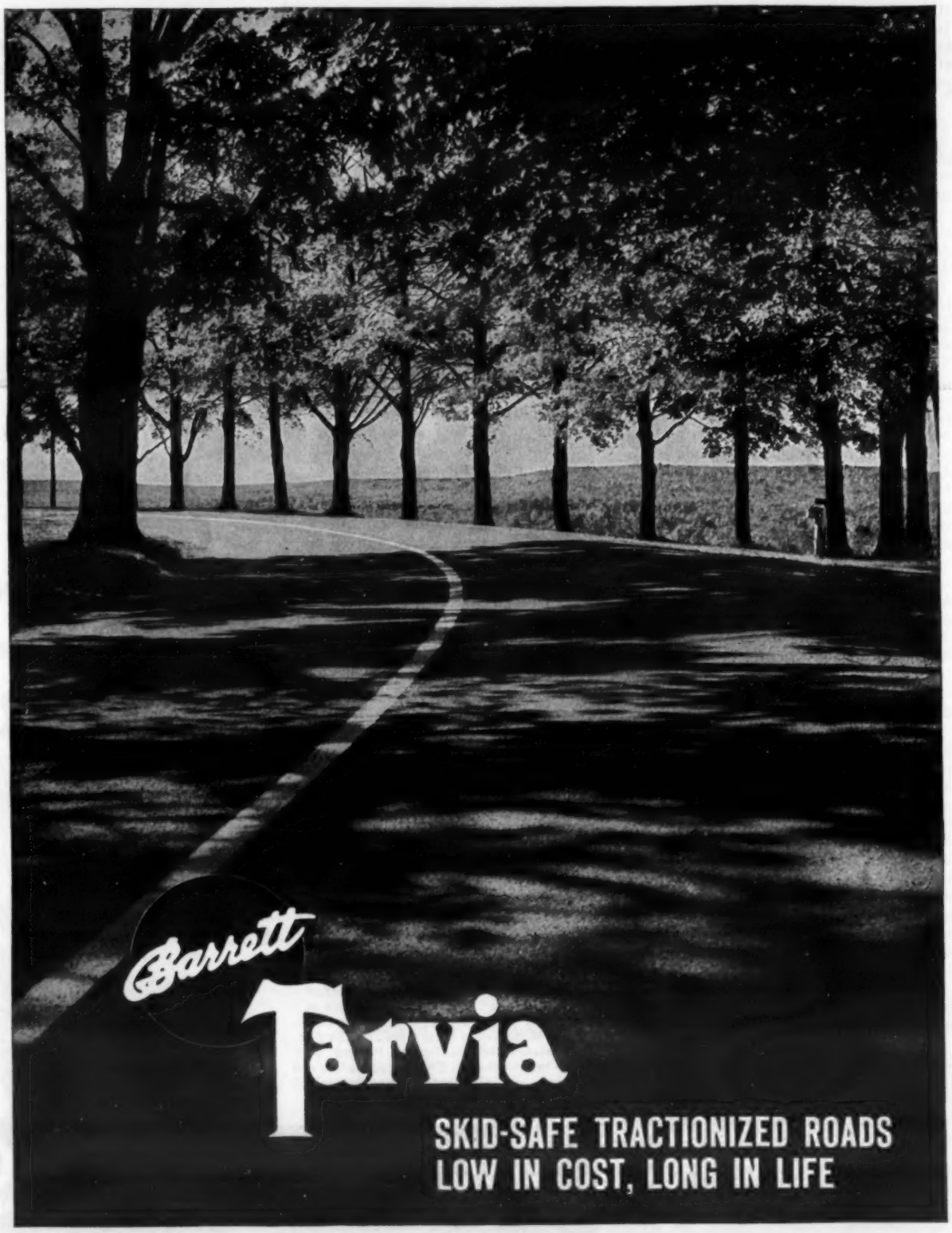
MARVEL

CONCRETE VIBRATORS

Gas or Electric

WE MANUFACTURE A COMPLETE LINE OF GASOLINE AND ELECTRIC CONCRETE VIBRATORS MOUNTED ON WHEELBARROW OR STATIONARY FRAMES. FOR FURTHER DETAILS, WRITE

Marvel Equipment Manufacturers, Inc.
224 So. Michigan Ave. Chicago, Ill.



THE BARRETT DIVISION
ALLIED CHEMICAL & DYE CORPORATION
40 Rector Street, New York

Chicago Birmingham St. Louis Detroit Philadelphia Boston Providence Lebanon, Pa. Rochester Baltimore Minneapolis Cleveland Columbus Toledo Youngstown Syracuse Hartford Buffalo Cincinnati Bethlehem Portland, Me. Norwood, N. Y.
In Canada: THE BARRETT COMPANY, LTD. Montreal Toronto Winnipeg Vancouver

. . . ONE OF AMERICA'S GREAT BASIC BUSINESSES

Outmoded Highways Brought Up-to-Date

(*Continued from page* 35)

A seal coat was applied, consisting of 0.2 gallon per square yard of RT-9 covered with 25 pounds per square yard of maximum ½-inch trap rock. The cover was rolled immediately after spreading. This seal coat protects the top-course material and also provides a more skid-resistant surface. The cost of this work was as follows:

Base-course material in place	$1.10	per cubic yard
Top-course material in place	$3.20	per cubic yard
Surface treated with seal coat	$0.065	per square yard

Black Base and Black Top

In the second method, bituminous gravel base course with bituminous gravel top course, the same procedure was followed, except for the material used in the base or wedge course. In this second method, this material was bank-run gravel shovel-mixed with tar binder at the rate of 12 gallons per cubic yard. The method of application was the same as that for method No. 1, and the cost of the wedge or base course was $2.40 per cubic yard in place.

Mixed-in-Place Base and Top

The third method, mixed-in-place bituminous trap-rock base course with mixed-in-place bituminous trap-rock top course, was quite different in the procedure of work and materials used. Engineering was provided to develop grades for modernizing the cross sections and superelevating the curves.

Measured by volume, 75 per cent of 1¼-inch trap rock and 25 per cent of ¾-inch trap rock were mixed at the quarry and the trap rock hauled by trucks on to the job and spread by a box spreader between the center line and the outside edge of the old pavement. RC-3 asphalt was applied on the stone at the rate of 10 gallons per ton of stone. Three power graders were used to blade-mix this material and grade it into place in a wedge course which ranged from 2 to 8 inches at the sides and feathered approximately 2 feet from the center line. At the curves, the wedge course was omitted on the inside of the curves and increased as required on the outside for banking. As soon as the material was graded into place, rolling was started, beginning at the side and working toward the center. Rolling was best accomplished with a 10-ton tandem roller. One-half the width of the road was prepared at a time in this manner.

When the base-course work was completed on both sides of the road, trap rock was hauled in by trucks and spread with a box spreader on one-half the width of the road approximately 1 inch in depth. This trap rock was 60 per cent ¾-inch and 40 per cent ½-inch by volume, mixed at the quarry. RC-3 asphalt was applied on this spread trap rock at the rate of 14 gallons per ton and the top-course material was mixed and screeded by a machine similar in type to those used by the Virginia Department of Highways. This machine was developed from a multi-blade maintainer 20 feet 6 inches in length and 10 feet in width. A series of short blades mixed the material, the long adjustable blade near the rear served as a screed, and pneumatic-tired wheels supported the frame. The rear wheels, located at the end of the frame, in back of the screed, travel on the surface of the screeded material. A hydraulic pump with a shaft is mounted just back of the center of the frame and when this pump shaft is forced downward, the rear wheels are raised from the ground and the machine can be turned in its own length.

It was originally intended, in this work, to place a 2-inch depth of material to be mixed at one time by this machine, but this proved more than its capacity. Therefore, the top was placed in two courses of approximately 1 inch each, and rolled following each application. This increased operation probably resulted in a smoother surface.

When the top course was completed on both sides of the road, a seal coat of ⅛ gallon of RC-5 asphalt per square yard was applied, covered with approximately 20 pounds of maximum ½-inch trap rock. The total cost of this work was $4.44 per ton of stone in place.

Plant-Mixed Base and Top

The fourth method, plant-mixed bituminous trap-rock base course with plant-mixed bituminous trap-rock top course, was carried out as a comparison to the mixed-in-place method. Engineering surveys were made prior to the work, as previously outlined.

A bituminous maintenance mixing plant was set up in a railroad freight yard close to a siding where aggregate could be unloaded from the railroad car directly into the hopper of the mixing plant by means of a belt-conveyor car unloader in conjunction with an ordinary belt conveyor. The car unloader was placed across the rails under the railroad car opening, eliminating the need of constructing an unloading pit. From the hopper of the mixing plant the aggregate was carried through a revolving drum with an oil burner at one end to provide intense heat which satisfactorily evaporated moisture and raised the temperature of the aggregate to 140 degrees F. From this heater, the aggregate was discharged in a controlled quantity into a pug mixer. The bitumen was pumped from a tank and sprayed in a regulated quantity onto the aggregate in the pug mixer. From the pug mixer the aggregate was discharged onto a belt conveyor, elevated and discharged into a waiting truck, the body of which was

(*Concluded on next page*)

A New Portable Tar And Asphalt Kettle

A sturdy and efficient portable tar and asphalt melting kettle has recently been announced by the Diamond Iron Works, Inc., and Mahr Mfg. Co. Div., Minneapolis, Minn. The frame of this new unit is of 3-inch channel steel with an electric-welded body of 12-gage steel covering a melting tank of 10-gage steel. The frame and body are mounted on a 2-inch standard axle, two pneumatic-tired wheels and semi-elliptical springs.

The burner used in this kettle is a Mahr self-contained torch outfit which burns kerosene, lights quickly and furnishes a long intense flame for many heating uses, the manufacturer states. This torch is made in three sizes. The flame of this burner shoots from the nozzle the entire length of the kettle bottom and at the rear end is directed up and back to the front, thoroughly heating the ends and sides before it leaves through the vent pipe. Unmelted material is kept separated from the hot material by a heavy steel screen so that the hot material will flow freely to the spigot, and the unmelted material falls naturally against the hot sides of the kettle. New material may be added at any time.

A new bulletin describing and illustrating the Diamond portable tar and asphalt kettle, which is available in capacities of 75, 110, 165, 210 and 315 gallons, may be secured direct from the manufacturer by referring to this item.

Welding Equipment Folder

Hobart Brothers Co., Box CE-91, Troy, Ohio, has available a vest-pocket-size folder entitled "Checking Pad for Cutting Costs, Speeding Work, Improving Quality, Increasing Profits by Arc Welding," which pictorially and editorially questions the reader about 23 typical arc welding applications.

Copies of this 40-page folder may be obtained direct from the manufacturer.

HARDSOCG BREAKERS *for Power, Speed and Endurance*

The C-59

Paving Breaker is used where much of the power of a heavy-weight breaker but the handling ease of a light-weight tool, is demanded.

NOTE THESE ADVANTAGES and make your next breaker a Hardsocg.

- Fully air-cushioned
- Automatic lubrication
- Low upkeep cost
- Long life
- Lowest air consumption
- Fewer parts
- Rugged, quick-acting, steel retainers
- Valveless
- Foreign matter passes through without interference and costly delay
- No freezing in even the coldest weather
- Fully guaranteed by one of the oldest Pneumatic tool builders

Write for details

MORE WORK! LESS AIR!

The C-86

Paving Breaker is suitable for a wide range of demolition work: cutting out pavement, cement floors, foundations, punching holes through concrete, brick or stone; for laying cables, gas mains, water pipes, street car tracks.

HARDSOCG DRILL COMPANY
227 So. Benton Street
OTTUMWA, IOWA

Williams Form Clamps RENT or SELL

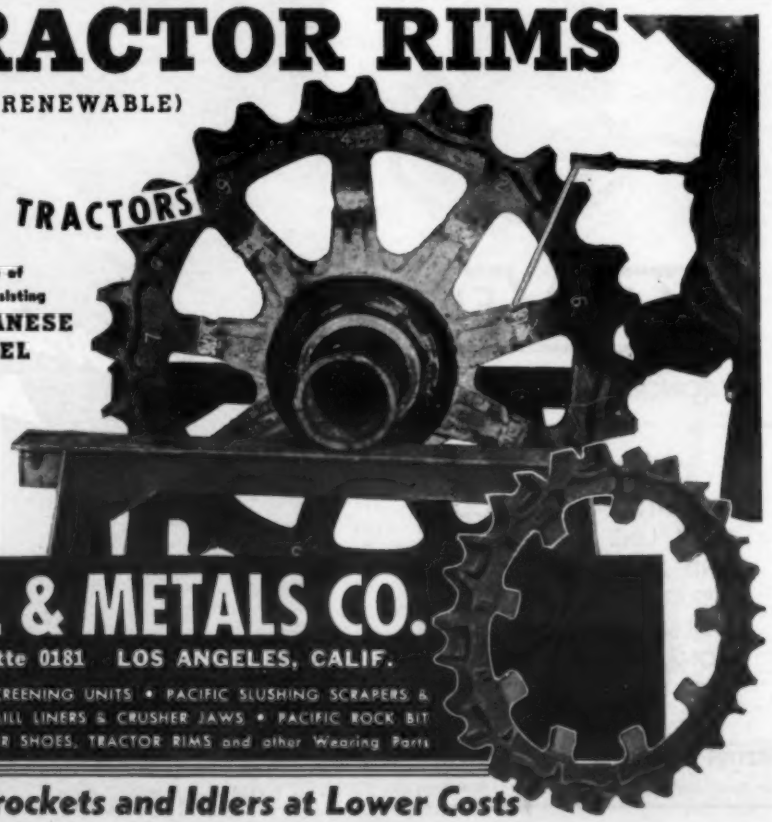
Cone, loosely mounted on rods not threaded, is recommended on some jobs.
Wide brackets eliminate use of washers and plates.
Inside rods have 1½" of threaded end to bond patch which will stand a hammer test.

Write for circular
WILLIAMS FORM ENGINEERING CORP.
GRAND RAPIDS MICH.

TRACTOR RIMS
(RENEWABLE)

FOR CATERPILLAR TRACTORS

made of wear-resisting **MANGANESE STEEL**



Substantial savings for busy tractor operators . . . Replace worn rims of sprockets and idlers with renewable Alloy-Manganese steel rims . . . They're abrasion-resistant, longer lasting and cost much less . . . Easily applied to old hubs . . . Welding instructions furnished.

Write for Bulletin No. 115

ALLOY STEEL & METALS CO.
1862 E. 55TH ST. LAfayette 0181 LOS ANGELES, CALIF.
Manufacturers of PACIFIC CRUSHING & SCREENING UNITS • PACIFIC SLUSHING SCRAPERS & SHEAVE BLOCKS • ALLOY-MANGANESE MILL LINERS & CRUSHER JAWS • PACIFIC ROCK BIT GRINDERS • HAND WINCHES • CRAWLER SHOES, TRACTOR RIMS and other Wearing Parts

ADDED LIFE *for Sprockets and Idlers at Lower Costs*

Connecticut Compares Modernizing Methods

(*Continued from preceding page*)

previously coated with a very fine spray of fuel oil. The daily output was approximately 180 tons of mixed aggregate.

The aggregate used for the base or wedge course was the same as that used in method No. 3, 75 per cent of 1¼-inch and 25 per cent of ½-inch trap rock mixed at the quarry. The bitumen was RC-4 asphalt, mixed with the aggregate at the rate of 14 gallons per ton of stone. The mixed material for both courses was hauled to the job by truck and discharged into a mechanical spreader. The wedge or base course work was carried out on one-half the width of the road at one time.

When all of the wedge course was in place and rolled with a 10-ton roller, work was started on the top course. This was also spread by a mechanical spreader on one-half the width of the road at a time to a depth of 2 inches and thoroughly rolled. Following this work, a seal coat of ⅛ gallon RC-5 asphalt was applied and covered with approximately 20 pounds of ½-inch trap rock. This was thoroughly rolled with a 10-ton roller. Heavy rolling caused much of the cover stone to break, which was desirable as a surface with a finer texture resulted.

The total cost of this work amounted to $4.82 per ton of stone in place. While this cost shows an increase of $0.38 per ton of stone in place over the cost of the mixed-in-place work, there are conditions which may justify the difference in cost. A comparison of the mixed-in-place work with the plant-mixed work indicated that the latter method is preferable for three specific reasons.

1. The mixed-in-place work required the aggregate to be placed on part of the roadway for a considerable distance ahead of the blade-mixing work. This caused inconvenience to traffic while work was in progress and frequently, when inclement weather prevented actual work from being carried on, the aggregate on the roadway was a nuisance to traffic. Also, following a rain, the aggregate had to be moved several times to evaporate excess moisture before work could be resumed. With the plant-mix method the aggregate in no way interfered with traffic.

2. The mixed-in-place method required three power graders, a roller, trucks to spread the aggregate, and fifteen men on the roadway at a time, which caused congestion and confusion. The plant-mixed method required a mechanical spreader, a truck to charge the spreader, a roller, and five men on the road.

3. In the mixed-in-place method, accurate control of the proportion of the bitumen in the mix was difficult, while in the plant-mixed method, control was very much more positive. Laboratory tests proved the proportions were quite accurate.

The costs given in the four methods will in all probability be lowered somewhat as the forces become more acquainted with the work.

From a paper presented before the 1941 Convention of the Association of Highway Officials of the North Atlantic States in Boston, Mass.

Want any information on equipment? Write the Editor.

Stemming Material For Blasting Jobs

Tamping of some type in powder-loaded drill holes to increase the efficiency of the powder charge is generally conceded to add to the effectiveness of the blasting operations, but there are certain types of material which are particularly adaptable for such use. This material should be light, uniform, economical, and unaffected by temperature changes.

Such a stemming material is produced by National Automotive Fibres, Inc., Oakland, California, Division, under the name of Tampcot. This material, which has been widely used in mining, has been reported to have increased efficiency in blasting, made possible savings in powder, better broken rounds and improved air conditions after shooting.

A four-page folder on Tampcot stemming, discussing the importance of tamping in blasting operations and the results achieved by its use, as well as a free sample of Tampcot, may be secured by interested contractors and engineers direct from the manufacturer by mentioning this magazine.

New Catalog Describes Self-Propelled Loader

On short hauls of less than one mile, the principal factor in determining hauling efficiency is not the road speed of the truck unit, but the length of time required to load the truck. The Athey Force-Feed loader, according to the Athey Truss Wheel Co., 5631 W. 65th St., Chicago, Ill., has been tried and proved in highway use and will handle a wide range of materials, windrowed or stockpiled, at high speed and in large volume, with clean pick-up.

A catalog, Form 750, recently issued by this company describes the machine in detail, tells "what it is and what it does", illustrates construction details and its use on a variety of jobs, and presents general specifications. Copies may be obtained direct from the manufacturer by mentioning this item.

CUMMER
ASPHALT PLANTS

Portable Combination Hot and Cold Mix Plants
Portable Hot Mix Plants
Stationary Combination Hot and Cold Mix Plants
Cummer Combination Dryer-Coolers.
Steam Jacketed Mixers 400 to 8000 pounds capacity.
Cummer Internal Fire Dryers
Electric Batch Timers

THE F. D. CUMMER & SON CO.
Euclid and 17th, Cleveland, Ohio

★ ★

Page *Automatic* Buckets are on the Frontline

AS ALL AMERICA DIGS IN!

★ ★

The American Excavation Industry is gallantly accepting today's challenge. The call is for S-P-E-E-D in production, all along the line.

On such essential projects as Island Bases, Cantonment Construction, Air Fields, etc., Page AUTOMATIC Dragline Buckets are living up to their reputation for faster digging and increased production . . . they're "doing their bit" with a vengeance!

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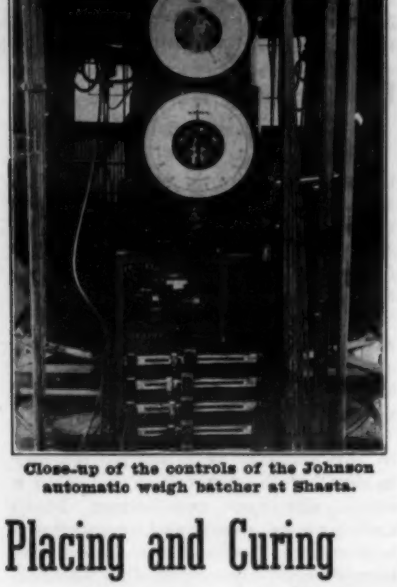

Close-up of the controls of the Johnson automatic weigh batcher at Shasta.

Placing and Curing Concrete at Shasta

(*Continued from page 2*)

purpose chute is so arranged that while not mixing power-house concrete it can work with the others on dam concrete. In such a case, it mixes 4 yards and dumps this in the chute and then mixes 4 yards more, which is held in the mixer. When the next car comes along the contents of chute and mixer will fill one 8-yard container.

Forms

Cantilever-type forms are employed, which have the advantage that there are no tie rods to interfere with the pouring. On the top of each lift of concrete is one set of pigtails into which she-bolts can be screwed to hold the form in the middle. A few bolts in the bottom of the form serve to pull it in at that point, or it may be wedged out, as the case may be, to get the proper alignment.

All inside forms are lined with 20-gage steel backed by shiplap. The timbers are 2 x 12 verticals in pairs, the pairs being on 2-foot centers. On all outside forms, the construction is similar, except that the timbers are in threes instead of pairs, slightly fanned out at the bottom. They rest against fillers outside of the keys and bridging the latter.

Placing the Concrete

The dam is built up in 50-foot-square blocks. The concrete is poured in 15-inch layers, 5 feet to the lift. Ordinarily, the layers are poured clear across, but in extremely hot weather, they are poured in terraces.

Eight men form the crew to each 8-yard bucket. Three two-man Chicago Pneumatic 519 electric vibrators are used. There is one man on a shovel to keep the rocks distributed, besides the foreman who completes the crew. About 4½ to 5 hours is required to pour one lift.

The company is now experimenting with a one-man pneumatic vibrator which is being developed by one of the shop men. This is said to do the work of the two-man electric type and it will be given a thorough trial as air is available.

Cooling and Curing

As soon as a lift is poured, the cooling pipes are placed and circulation of water started at once. This is kept up until the concrete is within 5 degrees of river water temperature. Immediate starting of the cooling water also has the advantage of showing up any leaks that may be present in the pipe system, which then can be remedied before it is time to pour the succeeding lift. On foundation rock, the pipes are laid on 2½-foot centers and from there up until a complete row of blocks, upstream and downstream, has been poured. After that, they are on 5-foot centers.

Concrete on the dam is cured with a sand covering. At first, this curing sand was secured by running it down through one of the mixers. This frequently held up a mixer and disturbed the routine. A bin has since been built over the circular track, filled from above and arranged to discharge direct to the containers on the cars.

After a lift has been poured, it is covered with a 2-inch layer of sand which, after wetting down, holds sufficient moisture for the curing process. When the sand is removed, the surface is that of freshly set concrete and requires no sand blasting in preparation for the next pour. Apparently it prevents the forming of calcium carbonate on the surface. When it is time to pour the next lift, the sand is swept up, loaded to skips and carried away by cableway. A mere hosing down is all that is necessary. Several usings can be obtained from the sand, but eventually it gets so dirty that it must be discarded.

Another advantage of using the curing sand is the fact that no sprinkling system need be installed and the block, being free from the encumbering pipe lines, is therefore considerably easier to work around.

In spite of the advantages of sand curing mentioned, the contractors are seriously considering discontinuing that method in favor of sand blasting in preparing surfaces for the succeeding lifts. The prime reason is that the sand curing method, even if it does do away with sand blasting and scouring, is rather costly. A good many man-hours of labor are required shoveling up the sand into the skips that are let down onto the block. The sand itself costs quite a bit and it can be used only four or five times. Experiments are being carried out on a number of blocks to get a comparison from the standpoint of economy.

Personnel

Shasta Dam, the largest feature of the Bureau of Reclamation's Central Valley Project, is being built under the supervision of Ralph Lowry, Construction Engineer. Labor and equipment are supplied by Pacific Constructors, Inc., the contractors, for whom Frank T. Crowe is General Superintendent.

This brief description has to do only with a single feature, the production and placing of the concrete. It is now not far to look ahead and see the end. The turbo generator units are being manufactured in the plants of the Allis-Chalmers Co. and General Electric Co. The five units, two of which are completed, will have a total generating capacity of 375,000 kw. The output is expected to be about 1,500,000,000 kilowatt hours annually, to be used in part for the operation of Central Valley Project pumping plants and the balance to be available for sale to parties contracting for its use.

New Paint Hose

A new type of hose for all standard paint and lacquer spraying equipment, replacing its present lacquer and Mainstay line of paint spray hose, has been announced by the B. F. Goodrich Co., Akron, Ohio. With the tube built of Ameripol, Goodrich's own type of synthetic rubber, this new hose is made with inside diameters of ¼, 5/16, ⅜ and ¼ inch and outside diameters of ½, 39/64, 11/16 and ⅞ inch, all standard dimensions for paint and lacquer spraying equipment.

In the ½-inch inside-diameter size, the construction is two-braid while all other sizes are one-braid, made of heavy high-tensile cords. The hose is capable of being used as an air hose, with an ample margin of safety, the manufacturer states. The tube is a black oil-resistant compound, and working pressure for all sizes is 150 pounds maximum.

With the addition of this new hose to its line, the B. F. Goodrich Co. now has a full range of synthetic rubber-lined hose from ¼-inch inside-diameter to the 10-inch inside-diameter Type 400 oil hose.

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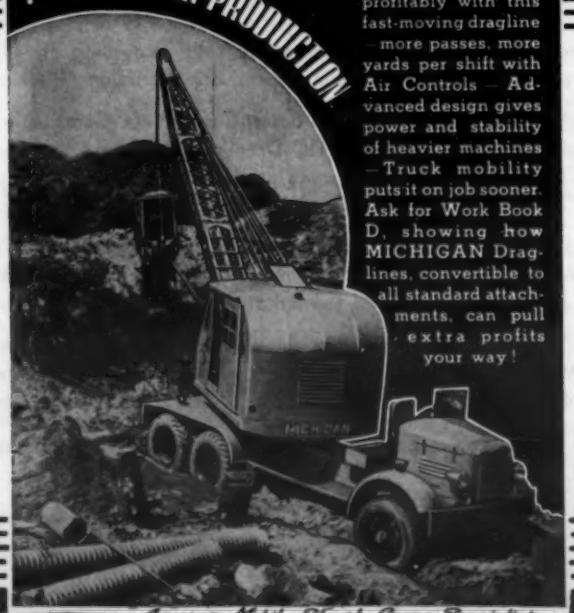

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C. & E. M. Photo

A Gorman-Rupp electric-driven pump unwatering a sump in the core trench area at Youghiogheny Dam.

Preparing Core Trench For Youghiogheny Dam

(*Continued from page* 13)

concrete for the outlet tunnel. The two bags of cement for the batch are dumped into the skip of a Koehring Dandie mixer. After a full 60-second mix the concrete is delivered to the three "Georgia" rubber-tired concrete buggies and poured directly into the trench.

To insure a clean dump of the aggregate from the wide batch trucks into the narrow skip of the mixer, the contractor built a wood frame which fits over the skip and has wings of sufficient width to gather in the batch as it is end-dumped from the batch truck. This wood frame or hopper is removed from the skip before the batch is dumped into the mixer drum. The concrete mix for the core trench is 1:2½:6.

Grouting Holes

Prior to the placing of the concrete, the 3-inch grout pipes are set in the center of the trench, spaced 5 feet on centers. The pipes are set carefully by a carpenter's level and with a jig or template at the top to insure a firm support. Running through the pipes are plugs driven into drilled holes 4 inches deep in the rock and about 4 feet long so that they reach 6 inches above the top of the pipes and into the template. The template is braced to the sides of the trench by boards nailed to it and held by rocks or braced against material excavated from the trench.

After the concrete has set, these pipes are used as guides for drilling grout holes down through the pipe and into the foundation rock, using 30-foot steel with I-R Jackbits operated by an Ingersoll-Rand wagon drill. After the holes are drilled, the pipes are capped and connected to a Gardner-Denver pneumatic grouting machine which applies the grout under 30 pounds pressure to fill completely any openings in the foundation rock for the full depth of 27 feet below the bottom of the trench.

Personnel

The contract for the embankment and spillway of Youghiogheny Dam was awarded to the associated contractors, Hunkin & Conkey Construction Co. of Cleveland, Ohio, and Shofner, Gordon & Hinman of Los Angeles, Calif., on the bid of $3,675,265.00. Work was started on June 13, 1941 and the first operation was the clearing of the site and the preparation of the core trench as described in this article. For the associated contractors Verne H. Robertson is Superintendent. The work is being done under the direction of the Pittsburgh District Office, U. S. Engineer Dept., Lt.-Col. D. Lee Hooper, District Engineer, with Charles H. Wagner as Resident Engineer.

Military Roads

A booklet entitled "Military Roads in Forward Areas" devoted to the construction and maintenance of roads in the theater of operations has recently been prepared by the Committee on Military Road Construction and Maintenance of the Highway Division of the American Society of Civil Engineers.

This manual is divided into two parts: the first covers road construction, including such subjects as general considerations, definitions and materials, equipment and organization, drainage and grading, untreated metaled surfaces, treated metaled surfaces and bituminous mats, the relationship between aggregate and bitumen, bitumen determination methods, the use of portland cement, high-type pavement, special road expedients such as metal mesh, corduroy, plank and tread roads, and contains special tables of pertinent information.

The second part is devoted to repair, maintenance and improvement, and covers maintenance organization and methods, bituminous patching and repair mixtures, and winter maintenance.

In bringing out this manual, No. 23 of the Society's Manuals of Engineering Practice, the Executive Committee of the Highway Division of the American Society of Civil Engineers concluded that the development of such a manual would constitute a service to our army and thus be a public service. Much of the information contained therein will also be of interest and help to state and county highway engineers, particularly in meeting the problems of speedy work on the strategic network or in any extraordinary maintenance or repairs to damaged roads.

Copies of Manual No. 23 may be secured direct from the American Society of Civil Engineers, 33 West 39th St., New York City. The manual sells for $1.40 per copy. Members are allowed a standard discount of 50 per cent on all manuals and reprints published by the Society.

Arc Welding Depicted On South Africa Stamps

The Union of South Africa has given recognition to the tremendous part arc welding is playing in its war effort by issuing a pair of stamps showing a welder using modern shielded electric arc equipment and dressed in protective head shield, gloves and other special clothing. The pair of stamps are of the 6d value, one of the pair printed in English and the other in Afrikaans, as is usual with all stamps of the Union of South Africa.

Lincoln Electric Co. officials who called this to our attention say that, as far as they know, this is the first time that such a stamp has been issued in the history of either stamps or arc welding.

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• *Left:* Heil Quality-Built Heavy-Duty Rock Body, with Heil twin-cylinder telescopic hoist.

• *Below:* Heil Quality-Built 8 cu. yd. dump body, with Heil single-cylinder telescopic hoist.

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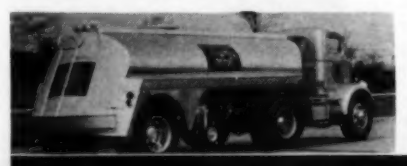

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Jersey Paving Job Was Well Handled

(*Continued from page 9*)

trucks backed for their batches, while they drove through the cement plant in a depressed roadway. As all trucks left the cement batching plant they received a ticket which was signed at the paver and turned in at the batching plant on the return trip. The Blaw-Knox bulk cement plant was equipped with high and low telltales which rang a bell to show when the tank was full or nearly empty, respectively.

A gasoline pump was located at a shed close by the batcher and a water pump, for helping thirsty truck radiators as well as men, was attached to the top of a well driven mid-way between the two batching plants.

The Joints

The important joints on any concrete job are the expansion joints and the longitudinal joints between slabs, where two lanes are poured adjacent. These two sets of joints are taken care of in the following manner in New Jersey, and this contractor had a slightly different approach to the handling of the interlocking flashing above the waterproofing mastic placed between adjacent slabs. The male flashing, which has an upright flange over which the female flashing is placed, is held to the first form by various ways on different contracts. Brewster had the steel road forms drilled uniformly for screws with wing nuts which held the flashing securely and did away with wires and clamps. When the forms had been stripped and the grade was being prepared for the second slab, the first waterproofing flashing was opened up by running a disk wheel about 8 inches in diameter between the face of the concrete and the male member of the flashing, and at the same time, tapping the flashing lightly with a hammer against the disk wheel, which performed two functions, namely, taking out any wrinkles or bends in the flashing and loosening any grout which might still be adhering to it. Immediately after this operation the premoulded bituminous joint material, which is 8 inches high and in 10-foot strips ¼-inch thick, was placed beneath the male flashing and the female flashing hooked over the first, ready to be cast into the second slab.

The standard New Jersey expansion joints are placed 56 feet 4 inches apart, although this varied slightly where it was necessary to meet existing conditions at bridges or intersections. The rigid assembled expansion joint was clamped to the outer form by a J-shaped clamp with set screw and to the concrete of the adjacent slab by screws set into female threads cast in the concrete of the first slab.

The Concrete Slab

With the subgrade and joints all prepared for the pouring of the slab there still remained the all important operation of providing water for the paver. The contractor installed 4.5 miles of water line which was fed by a Novo triplex pump. Connections were made at valves set in the line and then the paver hose, with Boss quick-acting couplings, was carried across the old road, which continuously handled heavy traffic, by cutting a slot just wide enough to take care of the hose. In this manner traffic was not slowed up beyond the precautionary amount for any traffic passing a paving operation, and those slots which were not in use caused no noticeable jar to vehicles driving over them.

Another difficulty which could not be overcome was the fact that the paver had to run on the shoulder of the old road and deliver concrete to the prepared grade about 5 feet above the shoulder. This made it very difficult to lift the 35-foot trussed boom of the paver so that the bottom of the spreader gate bucket did not hit the pile of excess material discharged by the Surgrader.

The man who unlatched the batch gates to release the individual batches also removed the covers from the cement containers and unlatched them so that they rotated and delivered the cement with the aggregates to the skip of the Koehring 34-E paver. Working with a 1-minute and 55-second mixing time the dual-drum paver regularly poured between 180 and 190 square yards of 10-inch uniform slab per hour. This figure is very good compared with the theoretical anticipated yardage of 218 square yards. Only two pit men were required on this job working ahead of the new Blaw-Knox spreader, which on its initial pass struck off the concrete 2 inches below the top of the forms for the reinforcing. As soon as the spreader had struck off the required length of slab, two men placed the tied bar mats of deformed bars, tied at the factory and weighing 77 pounds per 100 square feet of mat. The same men then compacted the top and depressed the mat into the concrete, using a 4 x 6 beam with plow handles.

Finishing and Curing

The second pass of the Blaw-Knox spreader carried the spreader at the elevation of the top of the forms and really started the finishing operation, which was further carried out by a Blaw-Knox mechanical finisher with a hydraulic lift for the screeds and a second Blaw-Knox 2-screed finisher running immediately behind. Prior to the finishing operation all concrete was vibrated along the sides and around both sides of the expansion joints, using a Viber vibrator. On either side of all expansion joints a 10-foot deformed ¾-inch U-bar with the ends turned down 4 inches was placed 6 inches from the forms, making four bars for the four corners of each slab.

The contractor used four hand finishers who started out using wide long-handled floats where needed, then used short wood floats on the edges and made the first cutting, placing ½ x ¾-inch metal strips on the side over the waterproofing flashing to fill the slot during later finishing. The surface was then dragged with a 10-foot California redwood straight-edge, followed by checking with a 10-foot Cleveland aluminum straight-edge. After this, came the broom finish and the edging at the sides and at the joints. The caps on the longitudinal

(*Concluded on next page*)

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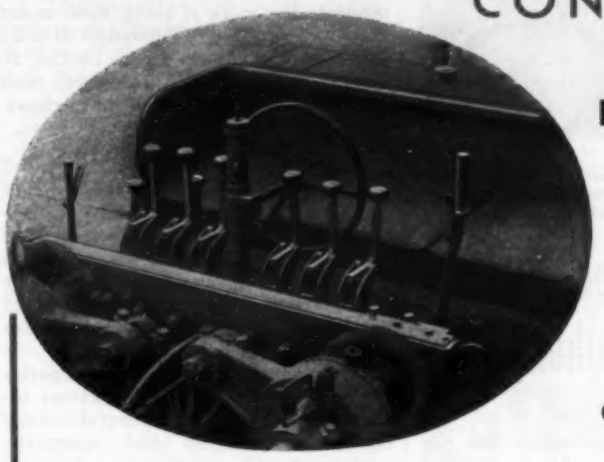

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Safety Built Into New Jersey Highway

(*Continued from preceding page*)

expansion joints were pulled by the man who also cleaned the adjacent slab when the second slab was being poured and did other odd jobs when the initial slab was poured.

As soon as the water had disappeared from the surface, following the broom finish and edging, the pavement was sprayed with an asphalt emulsion, using an Aeroil sprayer. An ample supply of Sisalkraft reinforced waterproofed kraft paper was maintained on the job to spread over the slab in case of rain to prevent the green concrete from being damaged by rain. This material was kept on a pneumatic-tired semi-trailer always close at hand.

Some Bridge Problems

The 18-foot clear span for the bridge over Big Ditch provided a foundation problem which was solved by the installation of a Complete Machinery & Equipment Co. wellpoint system. This bridge is located in an old swamp where foundation requirements were not easily met.

The bridge at Lawrence River was quite different as the footing was completed without sheeting or without the use of wellpoints. There was sufficient clay in the soil at this point to hold it on a vertical face. Wellpoints could not have been used anyway, because they could not have been carried 3 feet below the bottom of the footing as just below the bottom of the footing was a trap rock strata which is very uncommon in this section of New Jersey.

Major Quantities

The major quantities involved in this paving and bridge contract included the following items:

Unclassified excavation, roadway	53,600 cu. yds.
Ditch excavation	8,600 " "
Borrow excavation	31,000 " "
Concrete pavement removed	1,267 sq. yds.
Gravel sub-base, 8 inches thick	60,000 cu. yds.
Top soiling and seeding, 4 inches thick	72,000 sq. yds.
Top soiling and seeding, 6 inches thick	83,000 " "
Improved shoulders, gravel, 8 inches thick	98,000 " "
Reflecting white concrete vertical curb	11,545 ft.
Plain concrete curb 9 x 29 inches	1,170 "
2-way precast reflecting concrete sloping curb	2,135 "
Precast reflecting concrete sloping curb	15,131 "
Cast-in-place white concrete sloping curb, 1-foot radius	98 "
Concrete curb foundation	3,862 "
Broken stone or screened gravel	60 cu. yds.
Sodding	1,250 sq. yds.

C. & E. M. Photo

Delivering concrete to the grade with the spreader bucket of the 34-E paver.

Subgrade preparation	169,878 " "
Concrete pavement surface, 10-inch, plain	3,681 " "
Concrete pavement surface, 10-inch, reinforced	165,241 " "
Bridge approach slabs, 18-inch, reinforced	956 " "
Bituminous-concrete pavement 2 inches thick	22,000 " "
Gravel base 8 inches thick	23,000 " "
18-inch reinforced-concrete pipe	4,186 ft.
18-inch cast-iron culvert pipe	1,326 "
24-inch cast-iron culvert pipe	29 "
6-inch corrugated-metal bituminous-coated pipe	700 "
12-inch corrugated-metal bituminous-coated pipe	1,350 "
18-inch corrugated-metal bituminous-coated pipe	264 "
Underdrain	2,560 "
Wire rope railing	7,560 "
Concrete island paving	500 sq. yds.
Bituminous concrete pavement, temporary roadways	275 tons
Redressing, fertilizing and seeding	29,500 sq. yds.

Bridge Items

Foundation excavation	3,090 cu. yds.
Class B concrete, structures	2,458 " "
Class C " "	2,733 " "
Class D " "	28 " "
Concrete balustrade	554 ft.
Structural steel	835,300 lbs.
Reinforcing steel in structures	415,000 "
Waterproofing	1,245 sq. ft.
8-inch perforated corrugated metal pipe, bituminous coated	260 ft.
12-inch corrugated metal pipe, bituminous coated	100 "
Channel excavation	3,185 cu. yds.
Class B concrete excasement	423 " "
Cement mortar protection	34,740 sq. ft.

Personnel

The contract for paving Section 33-A on Route 25 in New Jersey was awarded to George M. Brewster & Son, Inc., of Bogota, N. J., for whom B. H. Vogt was Superintendent throughout the contract. The work was done for the New Jersey State Highway Department under the direction of H. D. Robbins, District Engineer for the Southern District, with H. A. Hartmann as Resident Engineer. Morris Goodkind is Bridge Engineer for the State Highway Department, and M. Vail was Resident Engineer for the bridges on this project.

Eighmy Equipt. Co. Named Link-Belt Speeder Dealer

Link-Belt Speeder Corp., Chicago, Ill., announced recently the appointment of Eighmy Equipment Co., 208 Blackhawk Bldg., Rockford, Ill., as distributor for the complete line of Link-Belt Speeder shovels-draglines-cranes, ranging from mobile 3/8-yard units to heavy-duty 3-yard machines. B. O. Eighmy, president of the company, was formerly associated with the Speeder organization for sixteen years, the last several years as Sales Manager.

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C. & E. M. Photo

Form work for the 36-foot span bridge at Station 270 on the M. A. Gammino Construction Co. grading and paving contract on Conn.-U. S. 44 between Eastford and Pomfret. See page 2.

C. & E. M. Photo

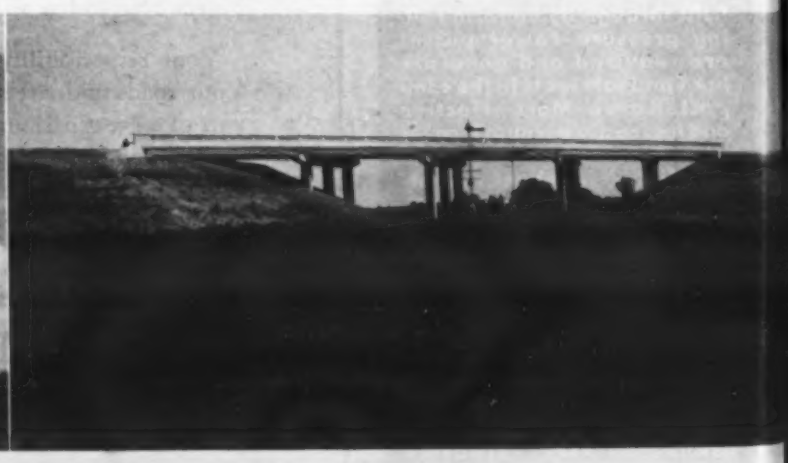
A D4 tractor pulling a sheepsfoot roller and spike-tooth harrow over the soil-cement treatment of Reservation Highway between Minnesota and South Dakota, for which M. E. Lien Constr. Co. was the contractor. See page 1.

The effective uniquely arranged asphalt plant, owned by Glynn County, Ga., on St. Simons Island. See page 17.

C. & E. M. Photo

The interior of the trailer-mounted repair shop owned by John Dieseth Co., highway contractor of Fergus Falls, Minn. See page 33.

U. S. Navy Photo

The dredge Crest, owned by Great Lakes Dredge & Dock Co., working at the Naval Drydock now under construction at Bayonne, N. J. See page 1.

Above, a Chicago, Milwaukee, St. Paul & Pacific locomotive crane setting a 74-foot I-beam span for the contractor for a new overhead at Milbank, S. D. Right, an Allis-Chalmers Model LO tractor with a log chain steadying an Adams leaning-wheel grader cutting the final 2 to 1 slope on the approach fill to the overhead structure. At far right, the completed 310-foot highway overpass crossing the tracks of the "Milwaukee Road" at the westerly entrance at Milbank. See page 27.